To: McClintock, Katie[McClintock.Katie@epa.gov]; Froikin, Sara[Froikin.Sara@epa.gov]
Cc: Russo, Todd[Russo.Todd@epa.gov]; Dubose, Dick[DuBose.Dick@epa.gov]; Kler, Denis[Kler.Denis@epa.gov]
From: Taylor, Kevin
Sent: Fri 3/4/2016 6:24:03 PM
Subject: Art Glass Screening Inspection Checklist

Katie/Sara,

This is the checklist that Region 4 developed to be used in the field to screen potential art glass facilities. The purpose of the checklist is to determine if activities at a facility have the potential to be a concern to the community and to begin to inventory the types of art glass facilities we have in the region. The checklist has three major parts. The first part of the checklist is used to cover the hobbyist and instructional glass operations that are not distributing or selling product. The second section covers the actual glass manufacturers that have the potential to fall within the scope of our investigation and meet the current 2500°F threshold. The third section is for facilities that fall below the 2500°F temperature threshold but have operations that may be of interest later as we become more knowledgeable about the art glass sector. We intend to forward the checklist to our state and local counterparts in Georgia and North Carolina so that they can use it for the inspections of Origin Glass (Elan Technology) in Georgia and Parramore Glass in North Carolina that are scheduled for Monday or Tuesday of next week. Therefore, please provide any comments, changes or corrections by 4:00 pm today so we can get the final checklist to the Georgia and North Carolina offices before Monday. Of course, if you have any comments, changes or corrections after today, they are still welcome but may not be incorporated into this first wave of investigations.

Thanks again for your support, knowledge and thoughtful consideration.

Sincerely,

Kevin I. Taylor

Environmental Engineer

U.S. EPA Region 4

Air Enforcement Section, 12th Floor

61 Forsyth Street, S.W.

Atlanta, Georgia 30303

(404) 562-9134

(404) 562-9163 (fax)

Email: taylor.kevin@epa.gov

To: Froikin, Sara[Froikin.Sara@epa.gov]
From: McClintock, Katie
Sent: Fri 3/4/2016 5:11:15 PM
Subject: Re: R4 colored glass update - 2 inspections yesterday, neither manufactures glass from raw material

Thanks I'm in meetings but I'll respond to that quickly. Thanks for the heads up and the info. I'm not at a computer so if I want to make more edits it might need to be tonight. Maybe cc Dan a in region 5 too

Sent from my iPhone

On Mar 4, 2016, at 9:09 AM, Froikin, Sara <Froikin.Sara@epa.gov> wrote:

ENFORCEMENT CONFIDENTIAL - INTERNAL ONLY

Hi Katie – I just spoke with R4, who did 2 colored glass inspections yesterday. They went to Armstrong Glass and Jennifer's Glassworks (a potential source they came across outside of the OAR memo list). Turns out neither one is manufacturing glass from raw materials (Armstrong used to manufacture, but now has two small kilns for educational demo purposes and just uses Kokomo glass and then molds it – or something like that; their current kilns don't go up to 2500 degrees). They're now writing a checklist for folks who are going out to do these inspections that they are hoping to share with some of their states later today. After our talk, they're going to send it to you and I so we can take a quick look, but can only wait a few hours to send it out because one of their states is doing an inspection on Monday.

On Monday, North Carolina is inspecting Parramore Glass; R4 believes this source is using a small amount of cadmium to make glass rods. They've also asked Georgia to inspect Origin Glass, not sure when that would be. Parramore, Origin, and Armstrong were the 3 R4 sources in the OAR memo.

FYI – The inspector yesterday was Kevin Taylor. I spoke with Dick Dubose, Todd Russo, and Kevin Taylor just now.

Sara Froikin, Attorney-Advisor

U.S. Environmental Protection Agency

290 Broadway

New York, NY 10007

Phone: 212-637-3263

To: Froikin, Sara[Froikin.Sara@epa.gov]
From: McClintock, Katie
Sent: Tue 2/16/2016 3:37:24 PM
Subject: RE: your spreadsheet

Yeah, I didn't realize that was all it said in the table. Both Bullseye and Uroboros said it is essential for all red, orange, yellow. Hence why once we add green (chromium) it is 60% or more of their production.

From: Froikin, Sara
Sent: Tuesday, February 16, 2016 7:36 AM
To: McClintock, Katie <McClintock.Katie@epa.gov>
Subject: RE: your spreadsheet

Thanks, Katie – very helpful.

Also, you've probably come across similar info already, but I notice that in the second tab cadmium is listed as being used to make yellow. I've also come across info online saying it can be used as part of making orange and red as well.

Sara Froikin, Attorney-Advisor

U.S. Environmental Protection Agency

290 Broadway

New York, NY 10007

Phone: 212-637-3263

From: McClintock, Katie
Sent: Monday, February 15, 2016 2:42 PM
To: Froikin, Sara <Froikin.Sara@epa.gov>
Subject: your spreadsheet

Sara –

Here is your spreadsheet and it explains why I removed a few and I have added tabs for the other sleuthing I have been up to this weekend. I'm gonna set up time for us to talk tomorrow morning too but wanted you to see what I have.

Katie McClintock

Air Enforcement Officer

EPA Region 10

1200 Sixth Avenue, Suite 900, OCE-101

Seattle, WA 98101

Phone: 206-553-2143

Fax: 206-553-4743

Mcclintock.katie@epa.gov

To: Taylor, Kevin[Taylor.Kevin@epa.gov]; McClintock, Katie[McClintock.Katie@epa.gov]
Cc: Russo, Todd[Russo.Todd@epa.gov]; Dubose, Dick[DuBose.Dick@epa.gov]; Kler, Denis[Kler.Denis@epa.gov]
From: Froikin, Sara
Sent: Fri 3/4/2016 8:29:39 PM
Subject: RE: Art Glass Screening Inspection Checklist

ATTORNEY-CLIENT PRIVILEGED

Also, as Kevin and I just discussed by phone, I recommend tweaking the title of the document to make sure this sounds more like a sharing our experience/some useful thoughts type document rather than a definitive list of questions.

Thanks!

Sara Froikin, Attorney-Advisor

U.S. Environmental Protection Agency

290 Broadway

New York, NY 10007

Phone: 212-637-3263

From: Taylor, Kevin
Sent: Friday, March 04, 2016 2:54 PM
To: McClintock, Katie <McClintock.Katie@epa.gov>; Froikin, Sara <Froikin.Sara@epa.gov>
Cc: Russo, Todd <Russo.Todd@epa.gov>; Dubose, Dick <DuBose.Dick@epa.gov>; Kler, Denis <Kler.Denis@epa.gov>
Subject: RE: Art Glass Screening Inspection Checklist

Sorry for my error. This is the attachment.

Sincerely,

Kevin I. Taylor

Environmental Engineer

U.S. EPA Region 4

Air Enforcement Section, 12th Floor

61 Forsyth Street, S.W.

Atlanta, Georgia 30303

(404) 562-9134

(404) 562-9163 (fax)

Email: taylor.kevin@epa.gov

From: Taylor, Kevin
Sent: Friday, March 04, 2016 1:24 PM
To: McClintock, Katie <McClintock.Katie@epa.gov>; Froikin, Sara <Froikin.Sara@epa.gov>
Cc: Russo, Todd <Russo.Todd@epa.gov>; Dubose, Dick <DuBose.Dick@epa.gov>; Kler, Denis <Kler.Denis@epa.gov>
Subject: Art Glass Screening Inspection Checklist

Katie/Sara,

This is the checklist that Region 4 developed to be used in the field to screen potential art glass facilities. The purpose of the checklist is to determine if activities at a facility have the potential to be a concern to the community and to begin to inventory the types of art glass facilities we have in the region. The checklist has three major parts. The first part of the checklist is used to cover the hobbyist and instructional glass operations that are not distributing or selling product. The second section covers the actual glass manufacturers that have the potential to fall within the scope of our investigation and meet the current 2500°F threshold. The third section is for facilities that fall below the 2500°F temperature threshold but have operations that may be of interest later as we become more knowledgeable about the art glass sector. We intend to forward

the checklist to our state and local counterparts in Georgia and North Carolina so that they can use it for the inspections of Origin Glass (Elan Technology) in Georgia and Parramore Glass in North Carolina that are scheduled for Monday or Tuesday of next week. Therefore, please provide any comments, changes or corrections by 4:00 pm today so we can get the final checklist to the Georgia and North Carolina offices before Monday. Of course, if you have any comments, changes or corrections after today, they are still welcome but may not be incorporated into this first wave of investigations.

Thanks again for your support, knowledge and thoughtful consideration.

Sincerely,

Kevin I. Taylor

Environmental Engineer

U.S. EPA Region 4

Air Enforcement Section, 12th Floor

61 Forsyth Street, S.W.

Atlanta, Georgia 30303

(404) 562-9134

(404) 562-9163 (fax)

Email: taylor.kevin@epa.gov

To: Taylor, Kevin[Taylor.Kevin@epa.gov]; McClintock, Katie[McClintock.Katie@epa.gov]
Cc: Russo, Todd[Russo.Todd@epa.gov]; Dubose, Dick[DuBose.Dick@epa.gov]; Kler, Denis[Kler.Denis@epa.gov]
From: Froikin, Sara
Sent: Fri 3/4/2016 8:18:56 PM
Subject: RE: Art Glass Screening Inspection Checklist
R4 ART GLASS INSPECTION CHECKLIST - sf attorney comments - 2016-03-04.docx

ATTORNEY-CLIENT PRIVILEGED

Thanks so much, Kevin. A few thoughts in redline here.

Sara Froikin, Attorney-Advisor

U.S. Environmental Protection Agency

290 Broadway

New York, NY 10007

Phone: 212-637-3263

From: Taylor, Kevin
Sent: Friday, March 04, 2016 2:54 PM
To: McClintock, Katie <McClintock.Katie@epa.gov>; Froikin, Sara <Froikin.Sara@epa.gov>
Cc: Russo, Todd <Russo.Todd@epa.gov>; Dubose, Dick <DuBose.Dick@epa.gov>; Kler, Denis <Kler.Denis@epa.gov>
Subject: RE: Art Glass Screening Inspection Checklist

Sorry for my error. This is the attachment.

Sincerely,

Kevin I. Taylor

Environmental Engineer

U.S. EPA Region 4

Air Enforcement Section, 12th Floor

61 Forsyth Street, S.W.

Atlanta, Georgia 30303

(404) 562-9134

(404) 562-9163 (fax)

Email: taylor.kevin@epa.gov

From: Taylor, Kevin
Sent: Friday, March 04, 2016 1:24 PM
To: McClintock, Katie <McClintock.Katie@epa.gov>; Froikin, Sara <Froikin.Sara@epa.gov>
Cc: Russo, Todd <Russo.Todd@epa.gov>; Dubose, Dick <DuBose.Dick@epa.gov>; Kler, Denis <Kler.Denis@epa.gov>
Subject: Art Glass Screening Inspection Checklist

Katie/Sara,

This is the checklist that Region 4 developed to be used in the field to screen potential art glass facilities. The purpose of the checklist is to determine if activities at a facility have the potential to be a concern to the community and to begin to inventory the types of art glass facilities we have in the region. The checklist has three major parts. The first part of the checklist is used to cover the hobbyist and instructional glass operations that are not distributing or selling product. The second section covers the actual glass manufacturers that have the potential to fall within the scope of our investigation and meet the current 2500°F threshold. The third section is for facilities that fall below the 2500°F temperature threshold but have operations that may be of interest later as we become more knowledgeable about the art glass sector. We intend to forward the checklist to our state and local counterparts in Georgia and North Carolina so that they can use it for the inspections of Origin Glass (Elan Technology) in Georgia and Parramore Glass in North Carolina that are scheduled for Monday or Tuesday of next week. Therefore, please provide any comments, changes or corrections by 4:00 pm today so we can get the final checklist to the Georgia and North Carolina offices before Monday. Of course, if you have any comments, changes or corrections after today, they are still welcome but may not be incorporated

into this first wave of investigations.

Thanks again for your support, knowledge and thoughtful consideration.

Sincerely,

Kevin I. Taylor

Environmental Engineer

U.S. EPA Region 4

Air Enforcement Section, 12th Floor

61 Forsyth Street, S.W.

Atlanta, Georgia 30303

(404) 562-9134

(404) 562-9163 (fax)

Email: taylor.kevin@epa.gov

ART GLASS INSPECTION CHECKLIST

1. General Information

   Facility Name _____

   Facility Address _____

   _____

   _____

   Facility Contact Name/Title _____

   Facility Phone Number _____

2. Does the facility use heat in the glass process?
   If so, describe the heat source(s) (kiln, furnace), the make and model of each heat source and the maximum temperature of each source and the actual temperature used for the process for each source. If no, write a description of what is done at the location for the record and conclude the investigation.

   a. Does the facility make, manufacture or design stained or colored glass or stained glass items for distribution or sales?
   Yes ___ (Go to **Glass Manufacturing Section**) No ___ (continue below)

   b. Does the facility supply stained or color glass for hobbyists or for instructional purposes?

   c. Describe the material used for the process (frit, glass bars, etc.) and the process involved in the design of the stained or colored glass (fusing, melting, etc.)?

   d. How much of each material is used on a daily or weekly basis (lbs, gals)?

   e. Are any metals added to the process? If yes, what is added and approximately how much?

   f. How is the raw material packaged (bulk totes, 1 pound packages, 8 once containers, etc.)?

Glass Manufacturing Section

1. Describe the process.

2. Describe the heat source(s) (kiln, furnace), the fuel for the heat source (electric, natural gas), the make, model and age of each heat source, the maximum temperature of each heat source and the actual temperature used for the process for each heat source.

3. If the maximum temperature is below 2300 °F, go to the **Low Temperature Glass Manufacturing** section.

4. For melting furnaces operating above 2300 °F:
   a. What is the refractory made out of for each furnace?
   b. Where is the temperature in the furnace measured?
   c. Are any furnaces using oxyfuel and, if so, when was it converted?
   d. Is the process continuous pull or batch? If batch, are the batches run one after another without a significant gap of time in between (describe in detail)?
   e. What is the process and timeline for heating and cooling the furnace for each melt if the furnace produces glass in batches (rather than continuously pulling glass)?
   f. Obtain a schematic of the furnace with dimensions.
   g. Obtain design information on the furnaces that includes holding capacity size and maximum glass flow in tons per hour or tons per year.

5. Describe the air pollutants emitted from the process.

6. How much glass product is made per month and per year?

7. Is any chromium added to the process and, if so, which product(s) is it added to, is it hexavalent or trivalent chromium, and how much is added to the process on a daily, weekly or monthly basis?

8. Are any other metals (such as cadmium, arsenic, lead, manganese, or nickel) added to the process and, if so, which products is it added to and how much is added to the process on a daily, weekly or monthly basis?

9. Where do the furnaces exhaust (roof stack, side building vent)?

10. Are there any air emission controls being used and, if so, describe what they are, how they operate and what parameters are used to monitor performance? Also, were the controls tested and, if so, get a copy of any test results.

11. If baghouses are used for controls, in addition to the requests made in question 10, above, please ask for the following:
    a. Obtain baghouse designs, flow rates and types of bags.
    b. What units or areas are exhausted through each baghouse.
    c. Has any waste analysis been performed on baghouse dust from any of the

furnaces and, if so, obtain a copy of the results.

12. Request records of products run for each furnace for the last month.

Low Temperature Glass Manufacturing

1. Describe the material(s) used for the process (frit, glass bars, etc.) and the process involved in the design of the stained or colored glass (fusing, melting, etc.)?

2. How much of each material is used on a daily or weekly basis (lbs, gals)?

3. Are any metals added to the process? If yes, what is added and approximately how much?

4. Are there any air emission controls being used and, if so, describe what they are, how they operate and what parameters are used to monitor performance? Also, were the controls tested and, if so, get a copy of any test results.

5. Is the process continuous pull or batch? If batch, are the batches run one after another without a significant gap of time in between (describe in detail)?

6. How is the raw material packaged (bulk totes, 1 pound packages, 8 once containers, etc.)?

Inspector Name _____ Date _____

To: McClintock, Katie[McClintock.Katie@epa.gov]
From: Froikin, Sara
Sent: Fri 3/4/2016 7:54:21 PM
Subject: RE: Art Glass Screening Inspection Checklist

Dick Dubose just emailed me that Kevin is going to resend.

Sara Froikin, Attorney-Advisor

U.S. Environmental Protection Agency

290 Broadway

New York, NY 10007

Phone: 212-637-3263

From: McClintock, Katie
Sent: Friday, March 04, 2016 2:48 PM
To: Froikin, Sara <Froikin.Sara@epa.gov>
Subject: Re: Art Glass Screening Inspection Checklist

I didn't get it either. I thought was just me so I asked him to paste in email so I can read and edit on phone right after he sent. I haven't heard back. I'm on lunch break but don't have much time. Can you try calling him?

Sent from my iPhone

On Mar 4, 2016, at 11:34 AM, Froikin, Sara <Froikin.Sara@epa.gov> wrote:

<image002.gif>

Thanks, Kevin. No attachment came through, though. Can someone try resending it?

Thanks!

Sara Froikin, Attorney-Advisor

U.S. Environmental Protection Agency

290 Broadway

New York, NY 10007

Phone: 212-637-3263

From: Taylor, Kevin
Sent: Friday, March 04, 2016 1:24 PM
To: McClintock, Katie <McClintock.Katie@epa.gov>; Froikin, Sara <Froikin.Sara@epa.gov>
Cc: Russo, Todd <Russo.Todd@epa.gov>; Dubose, Dick <DuBose.Dick@epa.gov>; Kler, Denis <Kler.Denis@epa.gov>
Subject: Art Glass Screening Inspection Checklist

Katie/Sara,

This is the checklist that Region 4 developed to be used in the field to screen potential art glass facilities. The purpose of the checklist is to determine if activities at a facility have the potential to be a concern to the community and to begin to inventory the types of art glass facilities we have in the region. The checklist has three major parts. The first part of the checklist is used to cover the hobbyist and instructional glass operations that are not distributing or selling product. The second section covers the actual glass manufacturers that have the potential to fall within the scope of our investigation and meet the current 2500°F threshold. The third section is for facilities that fall below the 2500°F temperature threshold but have operations that may be of interest later as we become more knowledgeable about the art glass sector. We intend to forward the checklist to our state and local counterparts in Georgia and North Carolina so that they can use it for the inspections of Origin Glass (Elan Technology) in Georgia and Parramore Glass in North Carolina that are scheduled for Monday or Tuesday of next week. Therefore, please provide any comments, changes or corrections by 4:00 pm today so we can get the final checklist to the Georgia and North Carolina offices before Monday. Of course, if you have any comments, changes or corrections after today, they are still welcome but may not be incorporated into this first wave of investigations.

Thanks again for your support, knowledge and thoughtful consideration.

Sincerely,

Kevin I. Taylor

Environmental Engineer

U.S. EPA Region 4

Air Enforcement Section, 12th Floor

61 Forsyth Street, S.W.

Atlanta, Georgia 30303

(404) 562-9134

(404) 562-9163 (fax)

Email: taylor.kevin@epa.gov

To: Taylor, Kevin[Taylor.Kevin@epa.gov]; McClintock, Katie[McClintock.Katie@epa.gov]
Cc: Russo, Todd[Russo.Todd@epa.gov]; Dubose, Dick[DuBose.Dick@epa.gov]; Kler, Denis[Kler.Denis@epa.gov]
From: Froikin, Sara
Sent: Fri 3/4/2016 7:34:28 PM
Subject: RE: Art Glass Screening Inspection Checklist

Thanks, Kevin. No attachment came through, though. Can someone try resending it?

Thanks!

Sara Froikin, Attorney-Advisor

U.S. Environmental Protection Agency

290 Broadway

New York, NY 10007

Phone: 212-637-3263

From: Taylor, Kevin
Sent: Friday, March 04, 2016 1:24 PM
To: McClintock, Katie <McClintock.Katie@epa.gov>; Froikin, Sara <Froikin.Sara@epa.gov>
Cc: Russo, Todd <Russo.Todd@epa.gov>; Dubose, Dick <DuBose.Dick@epa.gov>; Kler, Denis <Kler.Denis@epa.gov>
Subject: Art Glass Screening Inspection Checklist

Katie/Sara,

This is the checklist that Region 4 developed to be used in the field to screen potential art glass facilities. The purpose of the checklist is to determine if activities at a facility have the potential to be a concern to the community and to begin to inventory the types of art glass facilities we have in the region. The checklist has three major parts. The first part of the checklist is used to cover the hobbyist and instructional glass operations that are not distributing or selling product. The second section covers the actual glass manufacturers that have the potential to fall within the scope of our investigation and meet the current 2500°F threshold. The third section is for facilities that fall below the 2500°F temperature threshold but have operations that may be of

interest later as we become more knowledgeable about the art glass sector. We intend to forward the checklist to our state and local counterparts in Georgia and North Carolina so that they can use it for the inspections of Origin Glass (Elan Technology) in Georgia and Parramore Glass in North Carolina that are scheduled for Monday or Tuesday of next week. Therefore, please provide any comments, changes or corrections by 4:00 pm today so we can get the final checklist to the Georgia and North Carolina offices before Monday. Of course, if you have any comments, changes or corrections after today, they are still welcome but may not be incorporated into this first wave of investigations.

Thanks again for your support, knowledge and thoughtful consideration.

Sincerely,

Kevin I. Taylor

Environmental Engineer

U.S. EPA Region 4

Air Enforcement Section, 12th Floor

61 Forsyth Street, S.W.

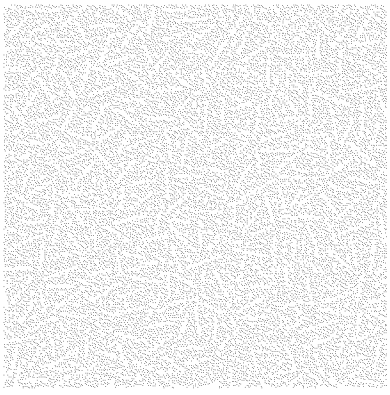
Atlanta, Georgia 30303

(404) 562-9134

(404) 562-9163 (fax)

Email: taylor.kevin@epa.gov

To: McClintock, Katie[McClintock.Katie@epa.gov]
From: Froikin, Sara
Sent: Thur 2/25/2016 4:00:32 PM
Subject: RE: updated list of art glass manufacturers



Thanks, Katie. No new regions –just more for the existing regions. I talked a little with Susan this morning. I didn't totally understand the borosilicate manufacturing risks, but maybe you can summarize for me at some point.

Susan also mentioned a daily call at 11:30 eastern (8:30 your time) and suggested I should be calling into that. Does that make sense to you? I hadn't heard of it before.

Sara Froikin, Attorney-Advisor

U.S. Environmental Protection Agency

290 Broadway

New York, NY 10007

Phone: 212-637-3263

From: McClintock, Katie
Sent: Thursday, February 25, 2016 10:57 AM
To: Froikin, Sara <Froikin.Sara@epa.gov>
Subject: FW: updated list of art glass manufacturers

From: Fairchild, Susan
Sent: Thursday, February 25, 2016 7:47 AM
To: Terry, Sara <Terry.Sara@epa.gov>; Koerber, Mike <Koerber.Mike@epa.gov>; McClintock, Katie <McClintock.Katie@epa.gov>; Narvaez, Madonna <Narvaez.Madonna@epa.gov>
Cc: Rimer, Kelly <Rimer.Kelly@epa.gov>; Barnett, Keith <Barnett.Keith@epa.gov>
Subject: updated list of art glass manufacturers

I've updated this list based on Katie's inspection of the Northstar facility, which identified other similar facilities making colored glass using a borosilicate recipe.

Susan Fairchild

Senior Environmental Scientist

(919) 541-5167

USPS Address:

OAQPS/SPPD/MMG

Mail Code D 243-04

Research Triangle Park, NC 27711

To: McClintock, Katie[McClintock.Katie@epa.gov]
From: Froikin, Sara
Sent: Tue 2/23/2016 1:20:43 PM
Subject: RE: Colored Glass 114 Draft

Will do. Greg and I spoke with Susan Fairchild yesterday who was telling us about the meeting.

Sara Froikin, Attorney-Advisor

U.S. Environmental Protection Agency

290 Broadway

New York, NY 10007

Phone: 212-637-3263

From: McClintock, Katie
Sent: Monday, February 22, 2016 11:14 PM
To: Froikin, Sara <Froikin.Sara@epa.gov>
Subject: RE: Colored Glass 114 Draft

Yes, I heard about that too. I think the conversations were between the head of Oregon DEQ and EPA and I'm guessing odeq will apply significant pressure for us to send 114s right away. I am very curious to hear the outcome. Keep me posted on anything you here.

Thanks.

From: Froikin, Sara
Sent: Monday, February 22, 2016 1:08 PM
To: McClintock, Katie <McClintock.Katie@epa.gov>; Fried, Gregory <Fried.Gregory@epa.gov>; Breneman, Sara <breneman.sara@epa.gov>; Dubose, Dick <DuBose.Dick@epa.gov>; Russo, Todd <Russo.Todd@epa.gov>; Maldonado, Zelma <Maldonado.Zelma@epa.gov>; Schaufelberger, Daniel <schaufelberger.daniel@epa.gov>; Prentice, Dakota <prentice.dakota@epa.gov>; Buettner, Robert <Buettner.Robert@epa.gov>; Spagg, Beverly <Spagg.Beverly@epa.gov>; Salazar, Matt <Salazar.Matt@epa.gov>; Sims,

Mark <Sims.Mark@epa.gov>; Brahmbhatt, Roshni <brahmbhatt.Roshni@epa.gov>; Patel, Harish <Patel.Harish@epa.gov>
Subject: RE: Colored Glass 114 Draft

Hi Folks,

Greg and I just heard that there may be some discussion with the Administrator regarding 114s for colored glass, so for anyone who was planning to send one out, please hold off actually sending it out the door until we hear back any thoughts the Administrator has on the matter. I think we'd hear within a couple days.

Thanks,

Sara Froikin, Attorney-Advisor

U.S. Environmental Protection Agency

290 Broadway

New York, NY 10007

Phone: 212-637-3263

From: McClintock, Katie
Sent: Friday, February 19, 2016 11:22 PM
To: McClintock, Katie <McClintock.Katie@epa.gov>; Fried, Gregory <Fried.Gregory@epa.gov>; Breneman, Sara <breneman.sara@epa.gov>; Dubose, Dick <DuBose.Dick@epa.gov>; Russo, Todd <Russo.Todd@epa.gov>; Maldonado, Zelma <Maldonado.Zelma@epa.gov>; Schaufelberger, Daniel <schaufelberger.daniel@epa.gov>; Prentice, Dakota <prentice.dakota@epa.gov>; Buettner, Robert <Buettner.Robert@epa.gov>; Spagg, Beverly <Spagg.Beverly@epa.gov>; Salazar, Matt <Salazar.Matt@epa.gov>; Sims, Mark <Sims.Mark@epa.gov>; Brahmbhatt, Roshni <brahmbhatt.Roshni@epa.gov>; Patel, Harish <Patel.Harish@epa.gov>; Froikin, Sara <Froikin.Sara@epa.gov>
Subject: FW: Colored Glass 114 Draft

Sorry I have not had a chance to address Sara's comments yet, but here is my draft with her comments/edits.

Let me or Sara know if you have questions.

Katie McClintock

Air Enforcement Officer

EPA Region 10

1200 Sixth Avenue, Suite 900, OCE-101

Seattle, WA 98101

Phone: 206-553-2143

Fax: 206-553-4743

Mcclintock.katie@epa.gov

To: McClintock, Katie[McClintock.Katie@epa.gov]
From: Froikin, Sara
Sent: Mon 2/22/2016 3:11:53 PM
Subject: RE: Anchor scheduling

Thanks, Katie. I'll just call Zelma directly. 1 PM eastern actually doesn't work well now for me, either.

And I'll work on a time for Anchor. Thanks!

Sara Froikin, Attorney-Advisor

U.S. Environmental Protection Agency

290 Broadway

New York, NY 10007

Phone: 212-637-3263

From: McClintock, Katie
Sent: Monday, February 22, 2016 10:11 AM
To: Froikin, Sara <Froikin.Sara@epa.gov>
Subject: RE: Anchor scheduling

I'm heading down to Portland in about 30 min. As such I might have to skip the 10 am call. Do you think you could brief them? I need to talk to Spectrum and I had moved them to 11 but I need to grab lunch before my noon meeting. Let me know if this works.

As to anchor, set something up for Thursday. I'll make it work.

From: Froikin, Sara
Sent: Monday, February 22, 2016 5:57 AM
To: McClintock, Katie <McClintock.Katie@epa.gov>

Subject: Anchor scheduling

Hi Katie – I'd like to schedule a team meeting for Anchor to discuss their offer. Would you have time to talk for 30 min or an hour either this Thursday or Monday? I can find a slot looking at the calendars, but wanted to check and see if you'll have time at all, since I know generally every minute of your day is spoken for these days. I know you're drowning in color glass, but I don't want Anchor to sit around too long.

Thanks!

Sara Froikin, Attorney-Advisor

U.S. Environmental Protection Agency

290 Broadway

New York, NY 10007

Phone: 212-637-3263

Company	City	State
These appear to be the big ones		
Bullseye Glass Company	Portland	Oregon
Urobos Glass	Portland	Oregon
System 96	Woodinville	Washington
Spectrum Glass Company	Woodinville	Washington
Kokomo Opalescent Glass	Kokomo	Indiana
The Paul Wissmach Glass Company (Wissmach)	Paden City	West Virginia
Youghiogheny Opalescent Glass Company	Connellsville	Pennsylvania
Armstrong Glass	Kennesaw	Georgia
Pacific Art Glass	Gardena	California
Blenko Glass	Milton	West Virginia
Steuben	Corning	New York
Northstar Glassworks	Portland	Oregon
can't find anything in ohio, really don't think we are missing anything		
unsure yet		
Northstar Glassworks	Portland	Oregon
Think not of interest:		
Jannette Specialty Glass	Jeanette	Pennsylvania
Optimum Art Glass	Eaton	Colorado
Fremont Glass	Seattle	Washington
franklin art glass		

Region
10
10
10
10
5
3
3
4
9
3
2
10
10
3
8
10

Notes

collaboration btwn Urobos and Spectrum

12 furnaces and one forming line.
stained glass sheets and glass products
stained glass, float glass, and fusing glass
make mostly clear flat glass but make several darker shades and some look greenish
make colored glass things, vases, etc. Blow and pull the glass so much smaller quantities because they have to work it
make clear specialty glass. Possible it is leaded. Investigate more.
borosilicate color - make mostly rod and tube. Not sure if gas melters or size.

borosilicate color palette

Makes borosilicate glass products, Looks like these guys make only clear glass, so no colors (no metals)
The description I found said they melt 97% recycled post consumer cullet. They do make colored glass, wonder if they ac
Can't find their website, but their glass is listed in an art supply catalog I found them too but probably smaller since no w
doesn't manufacture

ld colorants? If not, th
ebsite. We could alwa

rod and tube glass which was all electricly melted at uroboros due to much smaller quantities than plate

en no metal. Since no website, think likely way too small
ys check them out to get a sense of the small side

http://wissmachglass.com/thefactory.html

van gogh glass

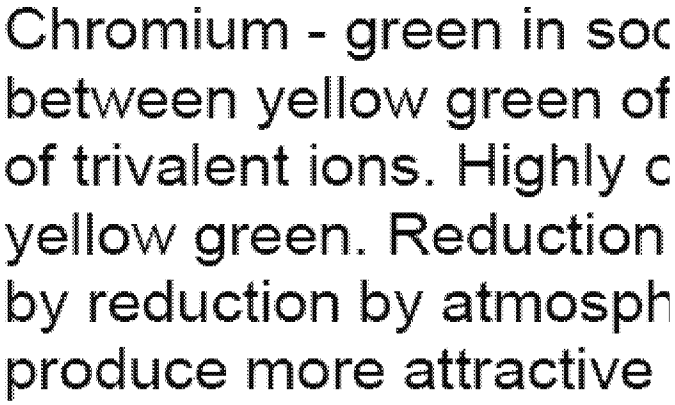
Most plants look like they stopped using chromium in 90s. Winchester Ardagh used as recently as 2011, repc
http://iaspub.epa.gov/enviro/tri_formr_v2.fac_list/tri_formr.fac_list?rptyear=2011&facopt=dcn&fvalue=131

According to glass packaging institute, all green is from chromium (III). Would a company have to report chrc
http://www.gpi.org/learn-about-glass/what-glass/glass-colorization
however then discusses oxidized and non oxidized colors.

http://www.lehigh.edu/imi/teched/GlassProcess/Lectures/Lecture04_Shelby_ColoredGlass.pdf
this lehigh presentation says use iron for glass
though it goes on to say chromium is added to make other shades of green.

ɔrted 201 lbs released to air (don't know if trivalent or hex)
.1209371184&fac_search=fac_beginning

ɔmium III in tri?



da lime glasses due to balance
: hexavalent ions and emerald green
oxidized glass are an unpleasant
of hexavalent content is obtained
here or use of a reducing agent to
color.

Metals Used to Impart Color to Glass	
Cadmium Sulfide	Yellow
Gold Chloride	Red
Cobalt Oxide	Blue-Violet
Manganese Dioxide	Purple
Nickel Oxide	Violet
Sulfur	Yellow-Amber
Chromic Oxide	Emerald Green
Uranium Oxide	Fluorescent Yellow, Green
Iron Oxide	Greens and Browns
Selenium Oxide	Reds
Carbon Oxides	Amber Brown
Antimony Oxides	White
Copper Compounds	Blue, Green, Red
Tin Compounds	White
Lead Compounds	Yellow
Manganese Dioxide	A "decoloring" agent
Sodium Nitrate	A "decoloring" agent

Iron, chromium, and copper all produce different green glass. Chrom

people buy chromium oxide (trivalent) to use with glazes - who knows about conversion
http://www.theceramicshop.com/store/product/353/Chromium-Oxide-by-the-lb./

some glases use frit.

dichroic glass
http://www.cbs-dichroic.com/faq.asp
They don't make the glass (they use frit), but they coat with metals (in a vacuum despotiion chamber), not sure what

http://www3.epa.gov/airtoxics/hlthef/chromium.html

Uses

The metal chromium is used mainly for making steel and other alloys. (1)
Chromium compounds, in either the chromium (III) or chromium (VI) forms, are used for chrome plating, the manufacture of dyes and pigments, leather and wood preservation, and treatment of cooling tower water. Smaller

The most important industrial sources of chromium in the atmosphere are those related to ferrochrome production. Ore refining, chemical and refractory processing, cement-producing plants, automobile brake lining and catalytic converters for automobiles, leather tanneries, and chrome pigments also contribute to the atmospheric burden of

People who live in the vicinity of chromium waste disposal sites or chromium manufacturing and processing plants have a greater probability of elevated chromium exposure than the general population. These exposures are generally to

1700 chrome platers in us according to earth justice in 2010
63 Subpart N - 1995

http://www.ecfr.gov/cgi-bin/text-idx?SID=7726c5610053b92e27a7f71399df255d&mc=true&node=sp40.10.63.n&rgn=di

Earth justice called in 2010 for us to rewrite and cited must better CA rule
http://www.treehugger.com/corporate-responsibility/epa-goes-easy-on-pollution-from-chrome-plating-facilities-public-

conversion to hexavalent even if you only use trivalent in coating
http://asterionstc.com/2014/09/hexavalent-to-trivalent-and-back-to-hex/

who reported in 2014 to TRI and actually reported releases
Columbia steel casting co
sapa inc, coatings division

Bulk Transportation portland terminal (next to apes) came up. Last chromium report was 2005 (253 lbs to air) and arseni

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

John O'Donnell
CEO
Kokomo Opalescent Glass
1310 South Market Street
Kokomo, IN 46902

Re: Supplemental Request to Provide Information Pursuant to Section 114 of the Clean Air Act

Dear Mr. O'Donnell,

The enclosed supplemental information request is being issued to you pursuant to Section 114 of the Clean Air Act (CAA), 42 U.S.C. § 7414. The Environmental Protection Agency is seeking additional information concerning Kokomo Opalescent Glass' facility in Kokomo, IN.

Under Section 114 of the CAA, EPA is authorized to require the submission of records, reports, and other information for the purpose of determining whether any violations of the CAA have occurred. In accordance with this authority, you are hereby served the enclosed Information Request, and required to provide the requested responses and documents within seven (7) days of receipt of this Request for questions 1-8. Provide the remaining responses within (30) days of receipt of this Request. See Enclosures 1 and 2 for the instructions, definitions, and Information Requests.

You must submit a copy of the full response to:

Sara Froikin
Stationary Source Enforcement Branch
Air Enforcement Division
U.S. Environmental Protection Agency
SARA's ADDRESS

Katie McClintock
EPA Region 10
1200 Sixth Avenue, Suite 900
Seattle, WA 98101

Regional contact

Commented [FS1]: We should confirm it should come to me, and not go to Greg, since I'm physically in NY now. If it comes to me, my address is:
290 Broadway, 16th Floor
New York, NY 10007

Commented [KM2]: Should I just represent oeca here. I would love to get a copy and I think it makes sense in the short term for me to the person the companies consult on technical questions on the 114.

Commented [FS3R2]: Agree you should get a copy. For non-R10 facilities, would make sense to list you as OECA/AED.

Commented [KM4]: Having them send to everyone means we don't have transmit cbi.

Failure to provide the required information in a timely manner may lead to civil action to obtain compliance or to recover a civil penalty in accordance with Section 113 of the CAA, 42 U.S.C. § 7413. EPA also has authority to seek criminal penalties from any person who knowingly makes any false statement, representation, or certification. Even if you fully comply with this letter, you may still be subject to administrative, civil, or criminal action as provided by the CAA.

You are entitled to assert a claim of business confidentiality, covering all or any required information, in the manner described at 40 C.F.R. § 2.203(b). See Enclosure 3 for instructions on assertion of business confidentiality claims. Note that emissions data, which includes information necessary to determine the identity, amount, frequency, concentration, or other characteristics (to the extent related to air quality) of emission data, is not entitled to confidential treatment. Information subject to a claim of business confidentiality will be made available to the public only in accordance with the procedures set forth at 40 C.F.R. Part 2, Subpart B. Unless a confidentiality claim is asserted at the time the required information is provided, EPA may make this information available to the public without further notice to you.

This required submission of information is not subject to the approval requirements of the Paperwork Reduction Act of 1980, 44 U.S.C. §§ 3501, et seq.

Any technical questions regarding this Information Request should be directed to Katie McClintock, Office of Civil Enforcement, at (206) 553-2143, mcclintock.katie@epa.gov; for legal matters, contact Sara Froikin, Office of Civil Enforcement, at (~~202~~212) ~~564-5805~~637-3263, ~~Froikin~~froikin.sara@epa.gov

Sincerely,

Phillip A. Brooks, Director
Air Enforcement Division

Enclosures (3)

cc: regional contact
Katie McClintock, EPA
Sara Froikin, EPA

ENCLOSURE 1

A. INSTRUCTIONS:

1) Please provide a separate narrative response to each Information Request and subpart of an Information Request set forth in Enclosure 2 of this Information Request and precede each answer with the number of the Information Request to which it corresponds.

2) For each Information Request, identify each person responding to any Information Request contained in this Information Request on your behalf, as well as each person consulted in the preparation of a response.

3) For each Information Request, identify each document consulted, examined, or referred to in the preparation of the response or that contains information responsive to the Information Request, and provide a true and correct copy of each such document if not provided in response to another specific Information Request. Indicate on each document produced in response to this Information Request the number of the Information Request to which it corresponds.

4) If requested information or documents are not known or are not available to you at the time of your response to this Information Request, but later become known or available to you, you must supplement your response to EPA. Moreover, should you find at any time after submission of your response that any portion is or becomes false, incomplete, or misrepresents the facts; you must provide EPA with a corrected response as soon as possible.

5) Requested information can be submitted in electronic form if applicable.

For purposes of this Information Request, the definitions set forth in Section B shall apply and should be considered carefully by you in preparing your responses.

B. DEFINITIONS:

1) "Document" means written documentation of any kind, including documentation solely in electronic form. It includes any document in the possession or control of Kokomo Opalescent Glass or the possession or control of any person or entity hired by Kokomo Opalescent Glass. A copy of a document rather than the original may be provided.

Commented [FS5]: Change to "acting as an agent of"?

2) "Facility" means the Kokomo Opalescent Glass facility in Kokomo, Indiana.

3) The terms "person" or "persons" shall have the meaning set forth in Section 302(e) of the Act, 42 U.S.C. § 7602(e), and include an individual, corporation, partnership, association, State, municipality, political subdivision of a State, and any agency, department, or instrumentality of the United States and any officer, agent or employee thereof.

4) The terms "you" or "your", as used above and in each Information Request set forth in Enclosure 2 of this Information Request, refer to, and shall mean, Kokomo Opalescent Glass, including its subsidiaries, divisions, affiliates, predecessors, successors, assigns, and its former and present officers, directors, agents, employees, representatives, attorneys, consultants, accountants and all other persons acting on its behalf.

ENCLOSURE 2

INFORMATION REQUEST

You are hereby required, in accordance with Section 114(a) of the Act, 42 U.S.C. § 7414(a), to provide the following information regarding the Facility.

1. Provide a facility plot plan or diagram of the Facility and a narrative description of ~~the~~ each glass manufacturing process conducted at the Facility. Both should include, but are not be limited to, all sources of emissions to the atmosphere, each glass melting furnace, batch mixing, pollution control devices, glass sheet reheating, annealing lehrs, frit processing, and other units that support glass production. Do not include electric kilns in a studio for work with finished glass product.

2. Provide a narrative description to accompany the above facility diagram including the entire process from the receipt of raw materials to the crushing of finished glass.

3. Provide a list of each glass melting furnace currently operating at the Facility.

4. For each furnace identified in response to Question 3, provide the following information:

    a. The type of the furnace (e.g., regenerative, recuperative, oxyfuel, electric);
    b. A schematic of the furnace including the tank size, burner position and exhaust points;
    c. A description of the furnace operation including how often the furnace is cooled down to ambient temperatures;
    d. For furnaces that pull glass out continuously, provide:
        i. The maximum pull of the furnace (tons/hr);
        ii. The holding capacity of the furnace (lbs);
        iii. The maximum pull of the furnace (tons/yr);
    e. For furnaces that melt glass in a batch process, provide:
        i. The maximum holding capacity of the furnace (lbs);
        ii. The maximum and minimum times between the start of two consecutive melts.
        iii. The calculated maximum annual production (tpy) and explanation of the calculation;

5. Annual production (tpy) from each furnace for the last 5 years.

Commented [FS6]: Want to be more specific than just "the process", but not sure this is just right technically.

Commented [FS7]: Do we mean each stack? Perhaps "all points of emission" is better than sources? Or all equipment feeding emissions to an emissions point? "Sources" seems vague.

Commented [FS8]: Is this redundant with the ask in qu 1? When we say the process", can we be more specific?

Commented [FS9]: Is this a clear term? I thought last week I'd picked up that "continuously" can mean two somewhat different things (regarding whether this means the furnace is always hot, or always full of glass, or something like that), but I could have gotten that wrong.

I that we said "pull glass out continuously" – I take it that clarifies. Do we really mean that glass is constantly coming out of the furnace?

Commented [KM10]: Not about nsr, just want an idea of normal throughput. We still won't get an idea of more max capacity unless we go back per 2008.

6. Provide a copy of the current air permit for the facility (if applicable) and the engineering support document.

7. A list of all raw materials used at the facility in the last 3 years and the material safety data sheet (MSDS) for each.

8. Provide purchase invoices for all compounds containing chromium, cadmium, arsenic, nickel and lead for the past 3 years.

9. A complete list of all batch recipes that the company has made in the last 3 years.

10. Daily batch records for the last year. For each batch indicate the date and furnace number as well as the complete ingredient list and quantity.

11. For each furnace identified in response to question 3, provide:

    a. An explanation of how raw materials are charged into the furnace;
    b. The fuel fired in ~~each~~ the furnace and the maximum combined firing rate (mmbtu/hr) ~~combined~~ for the burners in the furnace.
    c. The amount of electricity used to melt glass, if used.
    d. The date the furnace began operation;
    e. Any dates after 1986 that the Furnace was converted from air to oxyfuel, enlarged in size, or modified to increase air emissions. Provide the date of the project, a description of the project, and the effect on emissions and production.
    f. The dates of the last rebricking on the furnace.
    g. A list of all instances in the last 5 years when~~An explanation of whether~~ the furnace has been cooled to ambient temperature for a reason other than maintenance, malfunction, control device installation, reconstruction or rebuilding ~~in the last 5 years~~.? If so explain the date, the reason, and the length of time the furnace was at ambient temperature.

12. For each furnace identified in response to question 3, identify and describe any combustion or post-combustion emission control equipment or practices that are used for any reason. For each, provide the following information and provide data to support the answers:

    a. The reason the equipment was installed, the date of the installation and the pollutant(s) the equipment is designed to reduce.
    b. Describe in detail how each emission control equipment or reduction practice limits air emissions from each source, and how effectively (in terms of removal efficiency, capture efficiency, distribution efficiency, etc.) each air emission is limited by the corresponding equipment or practice.
    c. Any engineering documents for the control device ~~regarding~~ related to the emissions reduction performance of the controls device.
    d. Any engineering documents for ~~the~~ any capture system associated with the control device.

Commented [FS11]: Why nickel and lead as well?

Commented [FS12]: What are we looking to get? If we ask for a list of recipes, we might get things like "recipe 326, recipe 618." Do we want the recipes themselves? Their internal name and list of ingredients w/o amounts?

Commented [KM13]: A sense of historic emissions.

Commented [FS14]: Is there a unit for this? Do we mean their total electric bill, so to speak, or the amount of electricity per ton of glass, or something else?

Commented [KM15]: Batch melters don't use because they wouldn't stay submerged.

Commented [KM16]: Part 61 subpart N date

Commented [FS17]: I'm assuming this is the kind of performance we're interested in.

Commented [FS18]: What do we mean here by capture system?

e. If there is any monitoring of the device (temperature, pressure, etc) that is a parameter for performance, provide the source test establishing the parameter and the last year of records of that parameter.

13. Is the facility subject to Part 61, Subpart N? If so, provide the following records for the last two years:
    a. Annual emissions of arsenic from each furnace.
    b. All records required under 40 C.F.R. § 61.165.

14. Is the facility subject to Part 63, Subpart SSSSSS? If no furnaces are subject, explain for each why it is not subject. For any units that are subject provide a copy of the notifications required under 40 C.F.R. § 63.11456 and the last two years of records required under 40 C.F.R § 63.11457.

15. For raw material handling, provide a schematic of the batch mixing setup including the original batch mixing, mixing of the colorants, transfer of the batch to the blender, blending of the batch, transfer of the batch out of the blender, and charging the raw materials into the furnace. For each point, provide an explanation of any air pollution capture system, flow rates if known, and any design of the rooms/air system to limit dust creation. For each collection system, provide the total flow rates for each intake and the design flow rate of the system.

16. Does the Facility crush glass to sell as frit or for other disposal? If yes, provide a detailed schematic of the crushing operation. For each point of emissions in the process, provide an explanation of any air pollution capture efforts at that point including an explanation and drawing of the capture system. If the frit process is enclosed in any larger room, explain how this is done, openings to the larger factory and whether the room exhaust is vented to a control device. For the collection system, provide the total flow rates for each intake and the design flow rate of the system.

17. Does the facility spray any coatings on the glass? If so, describe the process in detail (including a detailed description of the process step where the coatings are applied), the chemicals sprayed along with their ~~Material Safety Data Sheets~~MSDSs, ~~the process step where the coatings are applied,~~ the quantity of each chemical used each year for the last 3 years, a description of emissions from the process (including a description of any visible emissions during coating) and a description of any emissions capture/control system.

18. For each baghouse, explain what is done with the baghouse dust. If the dust is melted onsite, explain where it is stored before melting, which furnace it is melted in, the frequency of the melting and what is done with the glass after melting.

19. Provide copies of each stack emissions test conducted on each furnace or baghouse stack since 1990. This request includes tests done to determine compliance with permits or regulatory standards, engineering tests, and tests for general information. Provide the batch records for all glasses made in furnaces, routed into the furnace, or batches mixed/blended that were routed into the baghouse.

Commented [FS19]: Do we mean to ask for these records for during the time each test was done, or just generally?

Also, we asked for daily batch records much earlier, so I'm not exactly sure what we're asking here (other than to ask for the batches being run during each test).

20. Provide information on the refractory the Facility uses in their furnaces, both for the tanks of the furnaces and the superstructure. If the Facility uses different refractory in different furnaces, provide information on the refractory products used in each furnace. For each refractory, provide the MSDS from the manufacturer and an invoice. If the facility uses the same refractory in each tank and superstructure, provide invoices since January 1, 2014.

21. For each furnace that measures temperature inside of the furnace, provide:
    a. The point where the temperature is measured;
    b. Temperature readings for the last year (on the frequency recorded) in spreadsheet format.

Commented [FS20]: Word choice? Do we mean "and"? Or do we mean something else?

ENCLOSURE 3

CONFIDENTIAL BUSINESS INFORMATION ASSERTION AND SUBSTANTIATION REQUIREMENTS

A. Assertion Requirements

You may assert a business confidentiality claim covering all or part of the information requested in response to this information request, as provided in 40 C.F.R. Section 2.203(b). You may assert a business confidentiality claim covering such information by placing on (or attaching to) the information you desire to assert a confidentiality claim, at the time it is submitted to the EPA, a cover sheet, stamped, or typed legend (or other suitable form of notice) employing language such as "trade secret" or "proprietary" or "company confidential." Allegedly confidential portions of otherwise non-confidential documents should be clearly identified, and may be submitted separately to facilitate identification and handling by the EPA. If you desire confidential treatment only until a certain date or until the occurrence of a certain event, the notice should so state. Information covered by such a claim will be disclosed by the EPA only to the extent, and by means of the procedures, set forth in Section 114(c) of the Clean Air Act (the Act) and 40 C.F.R. Part 2. The EPA will construe the failure to furnish a confidentiality claim with your response to the attached letter as a waiver of that claim, and the information may be made available to the public without further notice to you.

B. Substantiation Requirements

All confidentiality claims are subject to the EPA verification in accordance with 40 C.F.R. Part 2, subpart B. The criteria for determining whether material claimed as confidential is entitled to such treatment are set forth at 40 C.F.R. Sections 2.208 and 2.301, which provide, in part, that you must satisfactorily show that you have taken reasonable measures to protect the confidentiality of the information and that you intend to continue to do so; that the information is not and has not been reasonably obtainable by legitimate means without your consent; and the disclosure of the information is likely to cause substantial harm to your business's competitive edge.

Pursuant to 40 C.F.R. Part 2, subpart B, the EPA may at any time send you a letter asking you to substantiate fully your CBI claim. If you receive such a letter, you must provide the EPA with a response within the number of days set forth in the EPA request letter. Failure to submit your comments within that time would be regarded as a waiver of your confidentiality claim or claims, and the EPA may release the information. If you receive such a letter, the EPA will ask you to specify which portions of the information you consider confidential. You must be specific by page, paragraph, and sentence when identifying the information subject to your claim. Any information not specifically identified as subject to a confidentiality claim may be disclosed without further notice to you. For each item or class of information that you identify as being subject to CBI, you must answer the following questions, giving as much detail as possible, in accordance with 40 C.F.R. 2.204(e):

1. What specific portions of the information are alleged to be entitled to confidential treatment? For what period of time do you request that the information be maintained as confidential, until a certain date, until the occurrence of a specified event, or permanently? If the occurrence of a specific event will eliminate the need for confidentiality, please specify that event.

2. Information submitted to the EPA becomes stale over time. Why should the information you claim as confidential be protected for the time period specified in your answer to question #1?

3. What measures have you taken to protect the information claimed as confidential? Have you disclosed the information to anyone other than a governmental body or someone who is bound by an agreement not to disclose the information further? If so, why should the information still be considered confidential?

4. Is the information contained in any publicly available material such as the Internet, publicly available databases, promotional publications, annual reports, or articles? Is there any means by which a member of the public could obtain access to the information? Is the information of a kind that you would customarily not release to the public?

5. Has any governmental body made a determination as to the confidentiality of the information? If so, please attach a copy of the determination.

6. For each category of information claimed as confidential, explain with specificity why release of the information is likely to cause substantial harm to your competitive position. Explain the specific nature of those harmful effects, why they should be viewed as substantial, and the causal relationship between disclosure and such harmful effects. How could your competitors make use of this information to your detriment?

7. Do you assert that the information is submitted on a voluntary or a mandatory basis? Please explain the reason for your assertion. If you assert that the information is voluntarily submitted information, explain whether and why disclosure of the information would tend to lessen the availability to the EPA of similar information in the future.

8. Any other issue you deem relevant.

Please note that emission data provided under Section 114 of the Act, 42 U.S.C. Section 7414, is not entitled to confidential treatment under 40 C.F.R. Part 2, subpart B.

Emission data means, with reference to any source of emission of any substance into the air:

(A) Information necessary to determine the identity, amount, frequency, concentration, or other characteristics (to the extent related to air quality) of any emission which has been emitted by the source (or of any pollutant resulting from any emission by the source), or any combination of the foregoing;

(B) Information necessary to determine the identity, amount, frequency, concentration, or other characteristics (to the extent related to air quality) of the emissions which, under an applicable standard or limitation, the source was authorized to emit (including, to the extent necessary for such purposes, a description of the manner and rate of operation of the source); and

(C) A general description of the location and/or nature of the source to the extent necessary to identify the source and to distinguish it from other sources (including, to the extent necessary for such purposes, a description of the device, installation, or operation constituting the source).

40 C.F.R. Sections 2.301(a)(2)(i)(A), (B) and (C).

If you receive a request for a substantiation letter from the EPA, you bear the burden of substantiating your confidentiality claim. Conclusory allegations will be given little or no weight in the determination. If you fail to claim the information as confidential, it may be made available to the public without further notice to you.

To: McClintock, Katie[McClintock.Katie@epa.gov]
From: Froikin, Sara
Sent: Tue 2/16/2016 3:25:01 PM
Subject: RE: Colored Glass 114 Draft

Thanks, Katie.

Sara Froikin, Attorney-Advisor

U.S. Environmental Protection Agency

290 Broadway

New York, NY 10007

Phone: 212-637-3263

From: McClintock, Katie
Sent: Tuesday, February 16, 2016 10:25 AM
To: Froikin, Sara <Froikin.Sara@epa.gov>
Subject: Colored Glass 114 Draft

Slightly modified version – had my inspector look at it too.

From: Froikin, Sara
Location: katie call sara 212-637-3263
Importance: Normal
Subject: Accepted: check in on colored glass
Start Date/Time: Tue 2/16/2016 5:00:00 PM
End Date/Time: Tue 2/16/2016 6:00:00 PM

To: McClintock, Katie[McClintock.Katie@epa.gov]
From: Froikin, Sara
Sent: Thur 2/11/2016 3:58:28 PM
Subject: A few minutes to talk about glass

Hi Katie! I know you're probably swamped, but let me know when you might have a few minutes to talk about some non-Bullseye glass things. (Not urgent – again, I know you're probably swamped.)

Thanks!

Sara Froikin, Attorney-Advisor

U.S. Environmental Protection Agency

290 Broadway

New York, NY 10007

Phone: 212-637-3263

To: Hall, Chris[Hall.Christopher@epa.gov]; McClintock, Katie[McClintock.Katie@epa.gov]; Narvaez, Madonna[Narvaez.Madonna@epa.gov]; Hedgpeth, Zach[Hedgpeth.Zach@epa.gov]
From: Elleman, Robert
Sent: Tue 2/23/2016 8:51:56 PM
Subject: FW: Thank you for the data and information

Folks,

I got a bunch of met data from Oregon DEQ relating to the glass manufacturers, Bullseye in particular. I will talk it over with Katie this week hopefully.

Rob

From: Elleman, Robert
Sent: Tuesday, February 23, 2016 12:47 PM
To: Anthony Barnack <barnack.anthony@deq.state.or.us>; 'SCHUCKMAN Kathleen' <SCHUCKMAN.Kathleen@deq.state.or.us>; Christopher Swab <swab.christopher@deq.state.or.us>
Cc: Phil Allen <ALLEN.Philip@deq.state.or.us>
Subject: Thank you for the data and information

Anthony, Kathleen, and Chris,

Thank you for the data and background information. You all have done the first step analysis that I wanted to do, so that was great time savings on my end. ☺ I'll be in touch with Phil about meteorology soon.

Rob

Robert Elleman

Meteorologist

EPA Region 10, Seattle

(206) 553-1531

elleman.robert@epa.gov

To: McClintock, Katie[McClintock.Katie@epa.gov]; Hedgpeth, Zach[Hedgpeth.Zach@epa.gov]
From: McClintock, Katie
Sent: Fri 2/19/2016 3:49:05 PM
Subject: Conversation with McClintock, Katie

McClintock, Katie 7:16 AM:

so i am not in the office today which means i can't unfortunately give you my records. Though i need to ask if for a short period of time i can put the cbi on the share for you to print for the docs we have electronically and then pull it off after you print. Spectrum you won't be able to get, but we don't have a ton yet. If you get back to your desk i'd love to have a engineer check in on a big issue since i spend most of my time talking to non-engineers and there is one concerning thing i discovered last night

Hedgpeth, Zach 7:31 AM:

I'm back

To: McClintock, Katie[McClintock.Katie@epa.gov]; Hedgpeth, Zach[Hedgpeth.Zach@epa.gov]
From: McClintock, Katie
Sent: Fri 2/12/2016 5:00:00 PM
Subject: Conversation with McClintock, Katie

McClintock, Katie 8:26 AM:

that hayden island/now bullseye call is at 8;30 wed. I'd like to stay on til at least 9;30 but can do in car. do you mind planning on arriving at 9:30?

Hedgpeth, Zach 8:26 AM:

Sounds good.

I will send note and include KO and Renninger

McClintock, Katie 8:46 AM:

talking to renniger now

Hedgpeth, Zach 8:46 AM:

Ok

I'm going to come down now....have a couple thoughts I want to run by you.

McClintock, Katie 8:48 AM:

k

To: McClintock, Katie[McClintock.Katie@epa.gov]; Hedgpeth, Zach[Hedgpeth.Zach@epa.gov]
From: McClintock, Katie
Sent: Fri 2/12/2016 4:39:07 PM
Subject: Conversation with McClintock, Katie

McClintock, Katie 8:26 AM:

that hayden island/now bullseye call is at 8;30 wed. I'd like to stay on til at least 9;30 but can do in car. do you mind planning on arriving at 9:30?

Hedgpeth, Zach 8:26 AM:

Sounds good.

I will send note and include KO and Renninger

To: McClintock, Katie[McClintock.Katie@epa.gov]; Hedgpeth, Zach[Hedgpeth.Zach@epa.gov]
From: Environmental Engineer KATIE MCCLINTOCK
Sent: Fri 2/5/2016 7:26:26 PM
Subject: Conversation with Environmental Engineer KATIE MCCLINTOCK

Environmental Engineer KATIE MCCLINTOCK [10:30 AM]:

do you want to join us for an internal epa technical call on bullseye at 1? would be good to have you if you are free

Hedgpeth, Zach [10:31 AM]:

I'm free for 30 minutes...

Environmental Engineer KATIE MCCLINTOCK [10:32 AM]:

k, i just added you

Environmental Engineer KATIE MCCLINTOCK [11:14 AM]:

when do you quit today? could you do 3:30-4:30?

To: McClintock, Katie[McClintock.Katie@epa.gov]; Hedgpeth, Zach[Hedgpeth.Zach@epa.gov]
From: Environmental Engineer KATIE MCCLINTOCK
Sent: Fri 2/5/2016 6:44:07 PM
Subject: Conversation with Environmental Engineer KATIE MCCLINTOCK

Environmental Engineer KATIE MCCLINTOCK [10:30 AM]:

do you want to join us for an internal epa technical call on bullseye at 1? would be good to have you if you are free

Hedgpeth, Zach [10:31 AM]:

I'm free for 30 minutes...

Environmental Engineer KATIE MCCLINTOCK [10:32 AM]:

k, i just added you

To: McClintock, Katie[McClintock.Katie@epa.gov]; Hedgpeth, Zach[Hedgpeth.Zach@epa.gov]
From: McClintock, Katie
Sent: Fri 2/19/2016 3:18:14 PM
Subject: Missed conversation with McClintock, Katie

McClintock, Katie 7:16 AM:

so i am not in the office today which means i can't unfortunately give you my records. Though i need to ask if for a short period of time i can put the cbi on the share for you to print for the docs we have electronically and then pull it off after you print. Spectrum you won't be able to get, but we don't have a ton yet. If you get back to your desk i'd love to have a engineer check in on a big issue since i spend most of my time talking to non-engineers and there is one concerning thing i discovered last night

To: McClintock, Katie[McClintock.Katie@epa.gov]; Narvaez, Madonna[Narvaez.Madonna@epa.gov]; Koprowski, Paul[Koprowski.Paul@epa.gov]; Hedgpeth, Zach[Hedgpeth.Zach@epa.gov]
From: GRUNOW Greg
Sent: Thur 2/18/2016 8:38:54 PM
Subject: FW: Response to DEQ Information Requests
2016.02.17 Letter to DEQ re Information Request.pdf
Attachment 1 Batch Tickets Melt Date 20151007 (2).pdf
Attachment 2 Batch Tickets Melt Date 20151006 (2).pdf
Attachment 3.pdf
Attachment 4 Safety Data Sheet Sodium Bi-Chromate (4).pdf
Attachment 5 Safety Data Sheet Iron Chromate and Green Chromate Oxide (4....pdf

Greetings all,

Here is Bullseye's response to my 02/11/2016 data request…

Greg

Greg Grunow

Natural Resource Specialist

ODEQ Northwest Region

503-229-5690

grunow.greg@deq.state.or.us

From: Hunter, Jeffrey (Perkins Coie) [mailto:JHunter@perkinscoie.com]
Sent: Wednesday, February 17, 2016 5:24 PM
To: GRUNOW Greg; Garrahan Paul
Cc: Eric Durrin (ericdurrin@bullseyeglass.com)
Subject: RE: Response to DEQ Information Requests

Hello Greg:

On behalf of Bullseye Glass Company, please see the attached in response to DEQ's February 11, 2016 information requests. Please note that Attachments 1, 2 and 3 contain confidential business information.

Please call if you have any questions.

Paul, Bullseye will likely summarize for Dick and George the data on Attachment 3.

Jeffrey Hunter | **Perkins Coie LLP**

1120 N.W. Couch Street Tenth Floor

Portland, OR 97209-4128

D. +1.503.727.2265 – Portland

D. +1.303.291.2315 – Denver

M. +1.303.514.1896

F. +1.503.346.2265

E. JHunter@perkinscoie.com

Selected as 2015 "Law Firm of the Year" in Environmental Law by U.S. News – Best Lawyers® "Best Law Firms"

HUNTER
CHEMICAL LLC

220 COMMERCE DRIVE
SUITE 405
FORT WASHINGTON, PA 19034

DEKRA
ISO 9001:2008 Certified

(P) 215.461.1900
(F) 215.461.1919
www.hunterchem.com

CERTIFICATE OF ANALYSIS

Chrome Oxide Green HCR400

Date: October 14, 2014

Rec'd 10/17/14

Product: Chrome Oxide Green HCR400
Code: HCR400
Quantity: 4 x 25 kg bags 220.48 lb. Lot#: LW808-13

Consignee: Bullseye Glass Company
3722 SE 21st Avenue
Portland, OR 97202 United States
503-232-8887
PO #: 64625_M

Lot #LW808-13		
		Result %
Chrome Oxide	Cr_2O_3	99.6
Moisture		0.18
Aluminum	Al	0.07
Calcium	Ca	0.01
Carbon	C	0.081
Metallic Chromium	Cr	0.008
Hex Chrome	Cr^{+6}	<0.001
Iron	Fe	0.01
Magnesium	Mg	<0.01
Phosphorus	P	<0.01
Silicon	Si	0.01
Sodium	Na	0.05
Vanadium	V	0.01

Particle Size Analysis (Microtrac)	
% Passing	Micron
10	0.15
50	1.50
90	3.25

Certified true and correct:
Michael F. Aragon

New Supplier

PRINCEMINERALS®

DATA SHEET

Lion Chromate

Chromox™ 7903

$FeCr_2O_4$

Item Number: 07-7903

8/2012 forward

Typical Chemical Analysis

Cr_2O_3	44%
FeO	26.1%
Al_2O_3	14.8%
MgO	10.3%
SiO_2	3.4%
CaO	0.4%
Moisture	1.0%

Physical Description

Color	black-gray
Fineness	93% thru 400 Mesh
Apparent Bulk Density	
Loose	78 lb/ft^3
Compacted	155 lb/ft^3
Package	50 lb paper bag
	2000 lb Sack
	Bulk Truck/Rail

12/21/09 QSF208CB
Supercedes: 12/8/08

223 Hampshire • Quincy, IL 62301 Phone: 646-747-4200 Fax: 217-228-0466
www.princeminerals.com

Certificate of Analysis

Elementis Chromium Inc
Castle Hayne, NC 28429. US

ELEMENTIS
CHROMIUM

Customer:

Cascade Columbia Dist Co
6900 Fox Avenue South
Seattle WA 98108
United States

Material:	30025CCZ0050LBBG
Customer Part:	
Description:	SODIUM DICHROMATE DIHYDRATE

Bichromate

Customer Order: 84060 **Customer Specification:**

Our Order: 559048 SO **Ship From:** 3000 – Castle Hayne NC, 28429. US

Lot Number: 3000QXDK0101 **Ship Date:** 3 OCT 2014 **Quantity Shipped:** 360.000 EA

Date Mfg: 1 OCT 2014

Test	Result	UOM
Sodium dichromate dihydrate	100.62	%
Sodium Sulfate	0.14	%
% Sulphate	0.10	%
Sodium Chloride	0.006	%
Chloride	0.004	%
Vanadium Pentoxide	0.004	%
Vanadium	0.002	%
CrO3 (Equivalent)	67.53	%
Water of Hydration	11.50	%

Rec'd 3/25/15

Appearance: Orange–Red Crystals
pH is not measured but is approximately 4.0 in a 1.5% solution.

Vanadium (V), Vanadium Oxide (V205), Sodium Chloride (NaCl), Chloride(Cl)are typical analyses.
CrO3 is calculated from the assay and is on this equivalent basis even though it is not present in crystal in this form.
H2O is contained in the crystal structure as water of hydration and is not free moisture.
Meets GSA Commercial Item Description A–A–59123 [formely Federal Spec O–S–595b(1)].

Date: 3 OCT 2014 Time: 14:22:47 Page: 1 of 1

PERKINSCOIE

1120 NW Couch Street
10th Floor
Portland, OR 97209-4128

+1.503.727.2000
+1.503.727.2222
PerkinsCoie.com

Jeffrey L. Hunter
JHunter@perkinscoie.com
D. +1.503.727.2265
F. +1.503.346.2265

February 17, 2016

VIA CERTIFIED MAIL AND ELECTRONIC MAIL

Greg Grunow
Oregon Department of Environmental Quality
Northwest Region
700 NE Multnomah St., Suite 600
Portland, OR 97232

Re: Request for Information to Bullseye Glass Company

Dear Mr. Grunow:

On behalf of Bullseye Glass Company ("Bullseye"), this letter and accompanying information and documents are sent in response to your February 11, 2016 email (the "Information Request").

Pursuant to ORS § 192.501 and OAR 340-214-0130, Bullseye requests that Attachments 1, 2 and 3 that Bullseye is providing in response to DEQ's request be treated as "trade secrets" and be exempt from disclosure to the public. These documents disclose recipes and information that could be used to discern recipes. This information would be of value to Bullseye's business competitors. To ensure the confidentiality of this information, Bullseye limits knowledge only to a select number of individuals who have a commercial need for the information. Bullseye also takes measures to protect this information from public disclosure, including requiring non-disclosure agreements from employees, contractors and vendors and making similar formal requests to other federal and state agencies. Bullseye greatly appreciates your cooperation with its request that these records remain confidential.

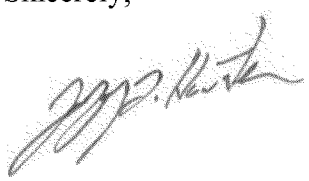
In submitting this response, Bullseye is not consenting to DEQ's authority to make the Information Request to Bullseye and reserves its right to object to DEQ's assertion of such authority. In addition, Bullseye does not waive any right, privilege, or objection which Bullseye may have in any subsequent proceeding related in any way to this response.

Bullseye reserves the right to object to the use of any information provided in this response for any evidentiary purpose whatsoever. By providing this response, Bullseye is not waiving any

privilege which may be claimed as to this response, any documents provided herein or which may be provided in the future, or as to any discussions related to the issues outlined in this response. Bullseye reserves the right to supplement this response.

Please call if you have any questions.

Sincerely,



Jeffrey L. Hunter
Counsel for Bullseye Glass Company

cc: Paul Garrahan, Oregon Attorney General's Office
Eric Durran, Bullseye Glass Company

Bullseye Glass Company's Responses to DEQ's Information Request

Bullseye Glass Company hereby responds to your information request. For your convenience, we have repeated the request followed by Bullseye's response.

Information Request No. 1: The facility's glass production data for 10/06/2015 and 10/24/2015 including:

- identify type and quantity of each product manufactured
- provide recipes and quantities of the raw materials used
- identify each Cr+3 and Cr+6 containing product and the respective quantity of Cr+3 and Cr+6 used for each day

Response: Bullseye Glass did not batch or produce glass on October 24, 2015. Attachment 1 contains the batch tickets for materials that were batched on October 5, 2015 and melted/casted on October 6. Attachment 2 contains the batch tickets that were batched on October 6, 2015 and melted/casted on October 7, 2015 (referenced below). The batch tickets identify the type of glass to be produced, the type and quantities of the raw materials, the batch weight and the theoretical weight of the glass after it is melted.

Based on Safety Data Sheets, the raw materials used in the batches on October 5 and 6 that potentially contain Cr+3 or Cr+6 are: Iron Chromate (Cr+3) and Sodium Bi-chromate (Cr+6).

Attachment No. 3 identifies the batches that used Iron Chromate and Sodium Bi-chromate and the estimated quantities of Cr+3 and Cr+6 used on October 5, 2015 and October 6, 2015.

Attachments 1, 2 and 3 are confidential business information and have been marked as such.

Information Request No. 2: Please summarize the following information regarding the facility's Cr+6 usage:

- quantity of Cr+6 used per year
- approximate number of product batches run per year containing Cr+6
- quantity (expressed as a range) of Cr+6 used per batch

Response: Sodium Bi-chromate is the only raw material that contains or may contain Cr+6 used by Bullseye to manufacture glass between February 1, 2015 and January 31, 2016. Bullseye uses Sodium Bi-chromate to prepare a pre-mix (P-Grn Mix) that is used as an ingredient in the glass manufacturing. Attachment 4 contains the Safety Data Sheet for Sodium Bi-chromate. Based on a review of the batch tickets between February 1, 2015 and January 31, 2016 and the Safety Data Sheet for Sodium Bi-chromate, Bullseye estimates that approximately 1,365 lbs. of Cr+6 was used to make glass between February 1, 2015 and January 31, 2016. This number may overestimate the actual amount of Cr+6 used. *See* Attachment 3 for the calculations.

Based upon a review of the batch tickets between February 1, 2015 and January 31, 2016, there were 1,049 product batches that used Sodium Bi-Chromate.

Based upon a review of the batch tickets between February 1, 2015 and January 31, 2016 and the Safety Data Sheets, Bullseye estimates that the amount of Cr+6 used in each batch ranged from 0.001 lbs. to 7.127 lbs. *See* Attachment 3 for the calculations.

Information Request No. 3: Quantity of Cr+3 used per year.

Response: Green chromate oxide and iron chromate are the raw materials that contain or may contain Cr+3 used by Bullseye to manufacture glass between February 1, 2015 and January 31, 2016. Bullseye uses these compounds to prepare a pre-mix (1112 Mix) that is used as an ingredient in the glass manufacturing. Attachment 5 contains the Safety Data Sheets for these raw materials. Based on a review of the batch tickets between February 1, 2015 and January 31, 2016 and the Safety Data Sheets for these raw materials, Bullseye estimates that approximately 439 lbs. of Cr+3 was used to make glass between February 1, 2015 and January 31, 2016. *See* Attachment 3 for the calculations.

To: McClintock, Katie[McClintock.Katie@epa.gov]; Hedgpeth, Zach[Hedgpeth.Zach@epa.gov]; owens.katherine@epamail.epa.gov[owens.katherine@epamail.epa.gov]
From: Brian Renninger
Sent: Thur 2/18/2016 6:57:44 PM
Subject: Spectrum Glass Test Report
Spectrum Test Report 11-24-03.pdf
RES540.pdf

Attached is a copy of the Spectrum Glass Emissions Test from 11-24-03.

Interesting thing about this test. From the details in Appendix A, it appears they used PSCAA method 5 (see attached board resolution for the method) which has EPA method 5 front half, plus addition procedures for measuring back half from the impingers. From just a quick scan it appears that the test firm used the total particulate result to calculate the g/kg value for demonstration with the Subpart CC limit rather than the front half only which would be more in line with the NSPS wording (which refers to using 60.8 and 40 CFR 60 Appendix A test methods).

Upshot, it still demonstrates compliance with the NSPS particulate limit but, does have some condensable information in there as well.

Brian Renninger, P.E.

Engineer

Puget Sound Clean Air Agency

206.689.4077

brianr@pscleanair.org

1904 Third Avenue, Suite 105

Seattle, WA 98101

"Working together for clean air"

www.pscleanair.org

RESOLUTION NO. 540

RESOLUTION OF THE BOARD OF DIRECTORS
OF THE PUGET SOUND AIR POLLUTION
CONTROL AGENCY ADOPTING MODIFIED
PARTICULATE SOURCE TEST PROCEDURES

WHEREAS, Regulation I Section 9.09(f) requires procedures for source sampling performed in connection with standards of Regulation I and II for particulate and gases to be done using current Environmental Protection Agency requirements or procedures and definitions adopted by the Board; and

WHEREAS, to conform to current safe and less toxic chemical storage, the particulate measurement procedures currently used by the Agency have been proposed for modification; and

WHEREAS, the Expanded Advisory Council reviewed and approved said source test laboratory procedure modifications; and

WHEREAS, a public hearing was held by the Puget Sound Air Pollution Control Agency Board of Directors on August 11, 1983, to allow public input and critique on the proposal; and

WHEREAS, the Board deems it necessary to adopt said modification to source test procedures; now therefore,

BE IT RESOLVED BY THE BOARD OF PUGET SOUND AIR POLLUTION CONTROL AGENCY:

The Board of Directors does hereby adopt the modifications to the source test procedures, a copy of which is attached hereto and made a part hereof.

PASSED AND APPROVED by the Board of Directors of the Puget Sound Air Pollution Control Agency held this 11th day of August, 1983.

PUGET SOUND AIR POLLUTION CONTROL AGENCY

By _____
Chairman

Attest:

_____
Air Pollution Control Officer

Approved as to form:

_____
Agency Attorney

Proposed Revised PSAPCA
Particulate Source Test Procedures

Engineering Division
Puget Sound Air Pollution Control Agency
200 West Mercer Street, Room 205
P.O. Box 9863
Seattle, Washington 98109

June 9, 1983

I. Procedures for Particulate Source Sampling

Unless otherwise authorized by the Control Officer, all particulate source sampling performed to demonstrate compliance with the emission standards of Regulation I shall be done using current Environmental Protection Agency Methods 1-5 contained in 40 CFR Part 60, Appendix A, as modified in Section II of this document.

II. Procedure for Determining Particulate Matter in the Impinger Catch (Back Half)

The analysis and calculations for Method 5 shall conform to that described by EPA in the current 40 CFR Part 60, Appendix A, except that the back half catch shall be included as particulate matter. The back half weight is the sum of the impinger catch (organic and inorganic) and the back half acetone rinse weights.

A. Sample Recovery of the Back Half

1. Purging

Whenever SO_2 interference is suspected, purge the impingers immediately after the test run is complete with N_2 or clean air for a minimum of one-half the sample volume.

2. Impinger Liquid

Measure the volume of water collected in all impingers and place the water from the first three impingers in a container. Thoroughly rinse all sample-exposed surfaces between the filter and fourth impinger with water and place in above container.

3. Acetone Rinse

Thoroughly rinse all sample-exposed surfaces between the filter and the fourth impinger with acetone and place the washings in a tared beaker to dry.

B. Analysis of the Back Half

1. Impinger Liquid Extraction

a. Add 50-100 mℓ of dichloromethane to the impinger liquid.

b. Spin for at least ten minutes.

c. Pour the liquid into a separatory funnel and drain the organic phase into a tared beaker (organic fraction).

d. Drain the remaining liquid into a beaker and repeat Steps a, b, and c. Perform the extraction several times with fresh dichloromethane until the organic fraction is clear. Keep each organic extraction in a separate beaker.

e. Following the last extraction, drain the remaining liquid from the separatory funnel into a tared beaker (inorganic fraction).

f. Allow the organic fraction beakers to dry under a hood at room temperature.

g. Evaporate the inorganic fraction in such a manner that the beaker contents do not become exposed to temperatures greater then 212°F.

h. Dry weighed beakers containing a sample of the acetone, dichloromethane and a sample of distilled deionized water to check for blank weight.

i. Desiccate organic, inorganic and blank beakers for at least 24 hours at room temperature in a disiccator containing silica gel. Weigh to a constant weight and report the results to the nearest 0.1 mg. Constant weight is defined in Section 4.3 of Method 5.

2. Back Half Acetone Rinse

a. Dry the acetone rinse in a hood at room temperature.

b. Desiccate and weigh the beaker to constant weight and record.

C. Reagents

1. Water

Use distilled deionized water in the impingers and to rinse all glassware.

2. Acetone

Use reagent grade, $\leq$ 0.001 percent residue in glass bottles.

3. Dichloromethane

Use reagent grade, $\leq$ 0.001 percent residue in glass bottles.

FA-JSS-14107-01-15-04

Spectrum Glass

January 13, 2004

John Schantz
Inspector
Puget Sound Clean Air Agency
110 Union Street
Suite 500
Seattle, WA 98101-2038

Subject: Recent Source Test Report

Dear Mr. Schantz,

We have completed all of the requirements of the Notice of Violation Number 3-000187. In this, we were required to perform a source test on Furnace 2 and Furnace 4.

I am sending the report on this Performance Test as requested. This report includes tests on Furnace #2 and Furnace #4. We followed the source test plan submitted and approved by you prior to testing. The results show that we are well within the allowable limits of the Order of Approval number 6497. We also showed that we were within the limits of 40CFR Subpart CC. We believe this satisfies the corrective action order described in the Notice of Violation.

Thank-You for your guidance and assistance in helping us get this done. Please advise if you have any questions or comments.

Best Regards,

Larry Witsell
Glass Technologist
Spectrum Glass Company

Cc: Fred Austin
Shorty Seel
Sherry Van Mondfrans

14107

TRC
Customer-Focused Solutions

EMISSION TEST REPORT

Particulate Matter & Opacity Emission Testing
#2 & #4 Glass Melting Furnaces

Date of Test: November 24, 2003

SPECTRUM GLASS COMPANY
Woodinville, Washington

Prepared for:

Spectrum Glass Company
24106 Snohomish-Woodinville Road
Woodinville, WA 98072-0646
(425) 483-6699

Prepared by:

TRC Environmental Corporation
19874 141st Place N.E.
Woodinville, WA 98072
(425) 489-1938

TRC Project #41613-0010-00000

January 9, 2004

TRC

Customer-Focused Solutions

EMISSION TEST REPORT

TRC PROJECT NO:	41613-0010-00000
TEST DATE:	November 24, 2003
TYPE OF TESTS:	Particulate Matter, Opacity
TESTED SOURCES:	#2 & #4 Furnaces
TEST SITE:	Spectrum Glass Company Woodinville, WA
PREPARED FOR:	Spectrum Glass Company 24106 Snohomish Woodinville Road Woodinville, WA 98072-0646 (425) 483-6699

REPORT CERTIFICATION

SUBMITTAL DATE

January 9, 2004

This project was carried out under my direction and supervision. To the best of my knowledge, the data presented in this report is accurate and complete.

Paul J. Clark
Field Team Leader
NW Air Measurements Manager

TABLE OF CONTENTS

SECTION **PAGE**

LIST OF APPENDICES

LIST OF TABLES AND FIGURES

SECTION 1
INTRODUCTION

Spectrum Glass Company operates a glass manufacturing facility in Woodinville, Washington. Spectrum Glass Company (Spectrum Glass) contracted TRC Environmental Corporation (TRC) in Woodinville, Washington to quantify particulate matter and opacity emissions at the #2 and #4 glass melting furnace stacks on November 24, 2003. The furnaces were tested while operating at their normal production rates using electrical power and natural gas to melt and refine glass. The production rates during these emission tests were approximately 1,050 and 950 kilograms per hour (kg/hr) for Furnaces #2 and #4, respectively. These emissions tests were performed to demonstrate compliance with the requirements of the Puget Sound Clean Air Agency (PSCAA).

All testing procedures were conducted in accordance with the guidelines published in the July 2001 edition of the US Environmental Protection Agency (EPA) document Title 40, Code of Federal Regulations, Part 60 (40CFR60), Appendix A, Methods 3A, 5, 9 and 22. Method 3A(modified) was performed to quantify Oxygen and Carbon Dioxide emissions for use in molecular weight calculations. Triplicate sixty (60) minute Method 5 tests were performed on each baghouse stack. Method 5 was performed to quantify particulate matter emissions. During daylight hours, Method 9 was performed to observe visible emissions (opacity). A total of eighteen (18) minutes of opacity readings was collected (6 minutes for each emissions test). During nighttime hours Method 22 was performed to observe visible emissions. A total of six (6) minutes of continuous opacity readings was collected for each emissions test. No visible emissions were observed during performance of Method 22.

The test program is summarized in Table 1.0.

Table 1.0
Source Test Parameters and Methodology

Source(s)	Test Parameters	Test Methodology
#2 & #4 Glass Melting Furnace Baghouse Stacks	Three (3) 60-minute tests for particulate matter	EPA Method 3A(modified) EPA Method 5
#2 & #4 Baghouse Stacks (18 mins. Each)	18 minutes of 15-second opacity readings OR	EPA Method 9
#2 Baghouse only	6 minutes of continuous observation for opacity	EPA Method 22

The source description, test procedures and quality assurance activities are described in the subsequent sections. All supporting field data, analytical reports, calibration records, and project participants are provided in appendices.

SECTION 2
SUMMARY OF TEST RESULTS

The test crew utilized the following EPA 40 CFR 60, Appendix A Reference Methods:

- Method 3A — Determination of Oxygen and Carbon Dioxide In Emissions from Stationary Sources (modified)
- Method 5 — Determination of Particulate Matter Emissions from Stationary Sources
- Method 9 — Visual Determination of the Opacity of Emissions From Stationary Sources
- Method 22 — Visual Determination of the Fugitive Emissions From Material Sources and Smoke Emissions From Flares

Particulate matter emission concentration results are reported in grains per dry standard cubic meter (gr/dscf). Particulate matter emission rates results for are reported in pounds per hour (lb/hr) and grams per kilograms (g/kg) of flat glass produced. Opacity emissions are reported in percent (%).

For this test program, particulate matter emission results were not blank-corrected.

Section 60.296 of Subpart CC in 40CFR60 allows for a zero production correction of 454 g/hr for flat glass. When this factor is subtracted from the measured particulate matter emissions, the results are then reported as zero.

A summary of the test results as compared to the emissions limits as specified by PSCAA and 40CFR60, Subpart CC is provided in Table 2.0.

Table 2.0
Summary of Average Results and Permit Limits

#2 & #4 Glass Melting Furnace Stacks

November 24, 2003

Spectrum Glass Company
Woodinville, Washington

Test Identification	Pollutant	Emission Unit	Run 1	Run 2	Run 3	Average	Permit Limit
FURNACE #2 Method 5	Particulate Matter	gr/dscf	0.003	0.006	0.004	0.004	*0.010*
		lb/hr	0.134	0.286	0.212	0.210	-
		g/kg	0.058	0.124	0.092	0.091	-
		g/kg	0.0	0.0	0.0	0.0	*0.225*[1]
	Volume of Gas Collected	dscf	56.756	41.924	41.302	46.601	*Minimum of 30.0 dscf*
Method 22	Visible Emissions	%	0	0	0	0	*0*
FURNACE #4 Method 5	Particulate Matter	gr/dscf	0.004	0.004	0.006	0.005	*0.010*
		lb/hr	0.164	0.158	0.226	0.182	-
		g/kg	0.078	0.076	0.108	0.087	-
		g/kg	0.0	0.0	0.0	0.0	*0.225*[1]
	Volume of Gas Collected	dscf	38.711	37.103	36.510	37.441	*Minimum of 30.0 dscf*
Method 9	Opacity	%	0	0	0	0	*0*

[1]Reported results reflect use of zero correction factor (454 g/hr subtracted from measured particulate matter) per Section 60.296 of 40CFR60, Subpart CC

SECTION 3
SOURCE PROCESS DESCRIPTION

Spectrum Glass Company operates two (2) glass melting furnaces fitted with baghouses for emission control devices (ECDs). Refer to Table 3.0 for process data recorded by the plant personnel during the emissions tests.

Table 3.0 Process Parameters

Parameter	Unit	Run 1	Run 2	Run 3	Average
FURNACE #2 Process Rate	pounds glass	2,573	2,496	2,611	2,560
Baghouse Pressure Drop	inches	4.9	4.9	4.9	4.9
Baghouse Inlet Temp	° F	252	252	252	252
Natural Gas Used	ft^3 natural gas	2,393.91	2,231.45	2,393.60	2339.65
FURNACE #4 Process Rate	pounds glass	2,199	2,164	2,199	2187
Baghouse Pressure Drop	inches	5.5	5.5	5.5	5.5
Baghouse Inlet Temp	° F	349	349	349	349
Natural Gas Used	ft^3 natural gas	2,561.58	2,231.45	2,393.60	2395.54

SECTION 4
SAMPLING AND ANALYTICAL PROCEDURES

All sampling and analytical procedures used in this test program were based on procedures published by the Environmental Protection Agency. These sampling and analytical procedures are contained in 40 CFR 60, Appendix A published by EPA. Copies of these methods are available from the EPA EMTIC electronic bulletin board or the Code of Federal Regulations.

4.1 OVERVIEW

This section describes the procedures that TRC followed during the field-sampling program. Throughout the program TRC followed *40 CFR Part 60, Appendix A* test methods.

The remainder of this section is divided into several subsections: Field Program Description, Pre-sampling Activities and Onsite Sampling Activities.

4.2 FIELD PROGRAM DESCRIPTION

TRC personnel conducted the field sampling and the following test methods from 40 CFR, Part 60, Appendix A were used:

- Method 3A — Determination of Oxygen and Carbon Dioxide In Emissions from Stationary Sources (modified)
- Method 5 — Determination of Particulate Matter Emissions from Stationary Sources
- Method 9 — Visual Determination of the Opacity of Emissions From Stationary Sources
- Method 22 — Visual Determination of the Fugitive Emissions From Material Sources and Smoke Emissions From Flares

4.3 TESTING METHODOLOGY

4.3.1 Traverse Point Location (EPA Method 1)

EPA Method 1 is performed as referenced by EPA Method 5. The procedures specified by EPA Method 1, "Sample and Velocity Traverses for Stationary Sources", were followed to determine the number and location of traverse points to be used for the stratification

testing and velocity traverses. The number of straight run stack diameters (equivalent diameters) upstream and downstream from the sample ports were used to determine the minimum number of traverse points required. Parallel or non-cyclonic gas stream flow was verified using a Type-S Pitot tube connected to an inclined-vertical oil manometer. The manometer has 0.01-inch gradations on the inclined scale and 0.10 inch gradations on the vertical scale. In practice, the Pitot tube is rotated so the planes of the face openings are perpendicular to the stack cross-sectional plane. This is referred to as the 0-degree reference position. A zero manometer reading obtained in this position indicates no cyclonic flow. If the manometer does not read zero, the Pitot tube is rotated up to a 90-degree yaw angle until a zero reading is obtained. The angle of rotation is measured to the nearest degree. All traverse points were examined in this fashion. If the average of all the rotation angles are less than 20 degrees, the reference method sampling ports was located at a point in the exhaust gas stream that is considered to be non-cyclonic.

The #2 Glass Melting Furnace stack has a 37-inch inside diameter (ID). The straight and unobstructed length of the stack before "B" the sample ports is approximately twenty feet (20') or 6.5 diameters and the straight and unobstructed distance after "A" the sample ports is approximately ten feet (10') feet or approximately 3.2 diameters. For this test program, the maximum number of traverse points or twenty four (24) traverse points were selected for sample collection to allow for sampling tow and one half (2.5) minutes per point to collect the samples over a sixty (60) minute sample period.

The #4 Glass Melting Furnace stack has a 40-inch inside diameter (ID). The straight and unobstructed length of the stack before "B" the sample ports is approximately thirty feet (30') or 9.0 diameters and the straight and unobstructed distance after "A" the sample ports is approximately ten feet (10') feet or approximately 3.0 diameters. For this test program, the maximum number of traverse points or twenty four (24) traverse points were selected for sample collection to allow for sampling two and one half (2.5) minutes per point to collect the samples over a sixty (60) minute sample period.

During the Method 5 tests at each furnace, the sample probe tip was moved to the minimum number of traverse points in each of the two (2) test ports, which are located 90 degrees apart, in each of the circular stacks. At each of the furnaces, 12-point traverses were performed in each of the two test ports at 2.1, 6.7, 11.8, 17.7, 25.0, 35.6, 64.4, 75.0, 82.3, 88.2, 93.3, and 97.9 percent of the stack diameter. A copy of each stack schematic with the actual traverse points used is included in the appendices of this report.

4.3.2 Stack Gas Velocity and Volumetric Flow Rate (EPA Method 2)

EPA Method 2 is included in EPA Method 5. The procedures delineated by EPA Method 2, "Determination of Stack Gas Velocity and Volumetric Flow Rate (Type-S Pitot tube)," were followed to determine the stack gas velocity and volumetric flow rate. From the results of the measurements taken in the preceding section to determine the number and location of traverse points, a velocity and temperature traverse was conducted for each test run. A Type-S Pitot tube and K-Type thermocouple was positioned at each traverse point, The Pitot tube differential pressure and exhaust gas temperature data was recorded on field data sheets. The Pitot tube was connected to an inclined-vertical oil manometer and the thermocouple was connected digital temperature readout. The Pitot tube, thermocouple and readout devices were calibrated in accordance with US EPA requirements prior to and after field use.

4.3.3 Oxygen and Carbon Dioxide Emissions (EPA Method 3A(modified))

Molecular weight of the stack gas was determined using a modified Method 3A. EPA Method 3A "Determination of Oxygen and Carbon Dioxide Concentrations In Emissions From Stationary Sources (Instrumental Analyzer Procedure)" was modified to incorporate the use of gas sample bags. A gas sample was collected into a tedlar bag during each test run. The gas samples were later analyzed using appropriate gas analyzers in the TRC lab.

4.3.4 Stack Gas Moisture Content

The moisture content of the stack gas was determined gravimetrically from the weight gain in each impinger from the Method 5 sampling trains.

4.3.5 Particulate Matter (EPA Method 5)

The EPA Method 5 sample train (Reference Figure 5.1) consisted of a stainless steel buttonhook nozzle attached to a heated glass lined stainless steal sheath probe. A thermocouple and S-type Pitot tube are permanently attached to the probe for measurement of stack gas temperature and velocity. Sample gas was drawn through the nozzle and probe and then through a heated glass fiber filter. The gas stream temperature across the filter was kept at 248 ± 25 °F.

Particulate matter collected on the filter, within the probe, and all connecting glassware from the filter holder top to the probe end was recovered, desiccated, and weighed to determine the total particulate catch. In the TRC laboratory, reagent and filter blanks was carried throughout the gravimetric analysis procedures. Each gravimetric sample was weighed to constant weights of ± 0.5 milligrams following desiccation in a cabinet desiccator. The Mettler AB204-S electronic balance used to obtain weights is set to a time integrating mode with a readability of 0.01 milligrams. The balance is calibrated prior to every weighing session. The balance is also certified by Mettler on an annual basis. For this project, a reagent blank was also analyzed in the same manner as the samples. For this test project, particulate matter emissions results were not blank-corrected.

Upon exiting the filter, the gas was drawn through a series of four impingers. The impinger system was as follows: 1st, 2nd, and 3rd contained 100 ml of Deionized (DI) H_2O and the 4th contained approximately 200g of silica gel. This apparatus comprised the back-half portion of the sampling train. Following the impinger system the gas was

drawn through a dry gas meter, a calibrated orifice, and a leak-free pump. Sampling was conducted isokinetically from sampling points pre-determined in EPA Method 1. A minimum of 60 minutes per test run was performed.

Leak checks on the particulate train were performed before and after each sampling run. All leak checks and leakage rates are documented on the relevant field test data sheets. Pre-run leak checks are not required by the method but are required by TRC. The pre-run leak check was performed at a minimum vacuum setting of 15 in. Hg. The acceptance criterion for the particulate train is a leak rate of 0.02 cfm at the highest vacuum obtained during the run. All leak rates must be within the method criteria in order to validate the test run.

4.3.6 Opacity Emissions (EPA Method 9)

During daylight hours EPA Method 9 opacity emissions observations were performed using procedures outlined in EPA Method 9. The observer stood at a distance sufficient to provide a clear view of the emissions with the sun oriented in the 140° sector to his back. The line of vision was perpendicular to the plume direction, and did not include more than one plume diameter. During each test, the time, estimated distance to the emission location, approximate wind direction, estimated wind speed, description of the sky condition (presence and color of clouds), and plume background were recorded on a field data sheet at the time opacity readings are initiated and completed. A total of 18 minutes of 15-second visible observations were collected at the baghouse stack before and after the emissions tests were performed.

4.3.7 Opacity Emissions (EPA Method 22)

During nighttime hours EPA Method 22 opacity emissions observations were performed using procedures outlined in EPA Method 22. The observer stood at a distance sufficient to provide a clear view of the emissions. The line of vision was perpendicular to the

to provide a clear view of the emissions. The line of vision was perpendicular to the plume direction, and did not include more than one plume diameter. When Method 9 opacity readings were unable to be performed due to nighttime hours a total of 6 minutes of continuous visible observations were collected during each test.

SECTION 5
QUALITY ASSURANCE

5.1 OVERVIEW

TRC Environmental Corporation management is fully committed to an effective Quality Assurance/Quality Control Program whose objective is the delivery of a quality product. For much of TRC's work, that product is data resulting from field measurements, sampling and analysis activities, engineering assessments, and the analysis of gathered data for planning purposes. The Quality Assurance Program works to provide complete, precise, accurate and representative data in a timely manner for each project, considering both the project's needs and budget constraints.

This section highlights the specific QA/QC procedures that were followed on this Test Program.

5.2 FIELD QUALITY CONTROL SUMMARY

5.2.1 Reagent Certifications

All reagents used for this project conform to the specifications established by the Committee on Analytical Reagents or the American Chemical Society (ACS), or the best available grade. Included in the appendices of this report are copies of the pertinent reagent certifications.

5.3 DATA REDUCTION, VALIDATION, AND REPORTING

Specific QC measures are used to ensure the generation of reliable data from sampling activities. Proper collection and organization of accurate information followed by clear and concise reporting of the data is a primary goal in all projects.

5.3.1 Data Validation

TRC supervisory and QC personnel use validation methods and criteria, appropriate to the type of data and the purpose of the measurement. Records of all data are maintained, including that judged to be an "outlying" or spurious value. The persons validating the data had sufficient knowledge of the technical work to identify questionable values.

The Field Team Leader and/or the QC Coordinator based on their review of the adherence to an approved sampling protocol and written sample collection procedure validate Field sampling data.

The following criteria was used to evaluate the field sampling data:

- Use of approved test procedures;
- Proper operation of the process being tested;
- Use of properly operating and calibrated equipment;
- Leak checks conducted before and after test.

5.3.2 Data Reporting

All data was reported in standard units depending on the measurement and the ultimate use of the data.

The bulk of the data was computer processed and reported as follows:

Exhaust Gas Stream

1. Stack exhaust
    a. Stack exhaust flow rates (reported in dscfm and acfm)
    b. Stack exhaust moisture content
2. Gas Diluents and Pollutants
    a. Particulate Matter – gr/dscf, lb/hr
    b. Opacity - %

APPENDIX A

COMPUTER PRINTOUTS OF RESULTS

TRC

TEST DATA SUMMARIES

Client: Spectrum Glass Company
Location: Woodinville, Washington
Unit: Furnace #2

EPA Method 5 w/PSCAA Back-Half - Particulate Matter & Condensible Particulate Matter

	Run 1	Run 2	Run 3
Dates:	11/24/03	11/24/03	11/24/03
Barometric Pressures:	29.77	29.77	29.77

TABLE OF CONTENTS:

Sampling Data Summary					
Parameter	Run 1	Run 2	Run 3		Average
Total Sampling Time, Min.	60	60	60		60
Stack Gas Oxygen Content, O2%	20.0	20.0	20.0		20.0
Stack Gas Carbon Dioxide Content, CO2%	4.0	4.0	4.0		4.0
Gas Sample Volume at Standard Conditions, cu. ft.	56.576	41.924	41.302		46.601
cu. m.	1.602	1.187	1.169		1.319
Dry Stack Gas Flow Rate (Dry, STP), dscf/min	6,103	5,968	5,862		5,978
dscm/min	173	169	166		169

TRC Environmental Corporation
19874 141st Place N.E.
Woodinville, WA 98072
Phone: (425) 489-1938
Fax: (425) 489-9564

Project Number **41613-0010-00000**

TRC Environmental Corp.

EMISSION MEASUREMENTS DEPARTMENT

19874 141st Place N.E.
Woodinville, WA 98072
Phone: (425) 489-1938
Fax: (425) 489-9564

CLIENT: Spectrum Glass Company — DATE: 11/24/03
LOCATION: Woodinville, Washington — PROJECT NO.: 41613-0010-00000
UNIT: Furnace #2 — PERSONNEL: DCT/MLE

Data Input Sheet

The table below contains the results of testing and calculations performed by TRC on the date(s) listed.

EPA Method 5 w/PSCAA Back-Half - Particulate Matter & Condensible Particulate Matter

Parameter	SYMBOL	UNITS				
Test Number			Run 1	Run 2	Run 3	
Test Date			11/24/03	11/24/03	11/24/03	
Start Time			1601	1725	1852	
Stop Time			1708	1830	2000	**Average**
Stack Diameter	ds	inches	37	37	37	
Nozzle Diameter	dn	inches	0.456	0.402	0.402	
Barometric Pressure	Pbar	inches Hg	29.77	29.77	29.77	29.77
Stack Static Pressure	Pg	inches H_2O	-0.50	-0.50	-0.50	-0.50
Pitot Coefficient	cp	none	0.84	0.84	0.84	0.84
Meter Calibration Factor	Y	none	0.992	0.992	0.992	
	DH@	none	1.719	1.719	1.719	
Stack Gas Oxygen Content	O_2	percent	20.0	20.0	20.0	20.0
Stack Gas Carbon Dioxide Content	CO_2	percent	4.0	4.0	4.0	4.0
Net Moisture Gain (Impingers w/SiGel)	Ww	grams	31.2	22.7	22.7	25.5
Average Stack Temperature	ts	degrees F	167.5	154.7	146.0	156.1
Average Meter Temperature	tm	degrees F	58.9	63.6	68.3	63.6
Avg Delta H	dH	inches H_2O	2.825	1.523	1.487	1.945
Average Square Root Delta H	ASR dH	inches H_2O	1.670	1.231	1.211	1.371
Avg Velocity Head	dP	inches H_2O	0.081	0.070	0.070	0.074
Average Square Root Delta P	ASR dP	inches H_2O	0.274	0.265	0.258	0.265
Gas Sample Volume	Vm	cubic feet	55.941	41.964	41.713	46.539
Total Sampling Time	min	minutes	60	60	60	

TRC Environmental Corp. EMISSION MEASUREMENTS DEPARTMENT

19874 141st Place N.E.
Woodinville, WA 98072
Phone: (425) 489-1938
Fax: (425) 489-9564

CLIENT:	Spectrum Glass Company	DATE:	11/24/03
LOCATION:	Woodinville, Washington	PROJECT NO.:	41613-0010-00000
UNIT:	Furnace #2	PERSONNEL:	DCT/MLE

Field Data Run Sheets

The table below contains the results of testing and calculations performed by TRC on the date(s) listed.

EPA Method 5 w/PSCAA Back-Half - Particulate Matter & Condensible Particulate Matter

RUN NO: Run 1 — PAGE ONE OF ONE
Minutes per point: 2.5 — OPERATOR: Doug Towne
number of points: 24

POINT NUMBER	TIME	DGM READING	VEL.	Sqrt	DIFF PRESS.		STACK TEMP.	DRY GAS METER TEMP (°F)	
		INITIAL	Dp (in. H_2O)	Dp	DH	Sqrt.	(°F)	INLET	OUTLET
B 1	0	78.459	0.09	0.300	3.20	1.789	161	57	56
2	3		0.08	0.283	2.90	1.703	164	56	56
3	5		0.09	0.300	3.20	1.789	166	57	56
4	8		0.10	0.316	3.50	1.897	166	57	56
5	10		0.13	0.361	4.00	2.000	170	58	51
6	13		0.12	0.346	3.90	1.975	172	58	56
7	15		0.10	0.316	3.50	1.871	173	59	56
8	18		0.10	0.316	3.50	1.871	173	59	56
9	20		0.11	0.332	3.60	1.949	174	60	57
10	23		0.05	0.224	1.80	1.342	172	60	57
11	25		0.05	0.224	1.80	1.342	171	60	57
12	28		0.05	0.224	1.80	1.342	170	61	58
A 1	30		0.08	0.080	2.80	1.673	165	60	59
2	33		0.08	0.283	2.80	1.673	169	60	60
3	35		0.08	0.283	2.80	1.673	169	61	60
4	38		0.07	0.265	2.50	1.581	169	61	60
5	40		0.08	0.283	2.80	1.673	169	61	59
6	43		0.08	0.283	2.80	1.673	167	61	59
7	45		0.06	0.245	2.10	1.449	166	62	59
8	48		0.07	0.265	2.50	1.581	165	62	59
9	50		0.07	0.265	2.50	1.581	164	63	59
10	53		0.06	0.245	2.20	1.483	163	63	59
11	55		0.07	0.265	2.50	1.581	161	63	60
12	58		0.07	0.265	2.50	1.581	160	63	60
	60	134.400							
	Total	Total	Avg.	Avg.	Avg.	Avg.	Avg.		Avg.
	60	55.941	0.08	0.274	2.825	1.670	167.5		58.9

Impinger Gain

impinger 1:	709.4	705.9	3.50
impinger 2:	704.5	692.8	11.70
impinger 3:	718.0	715.7	2.30
impinger 4:	974.0	960.3	13.70
impinger 5:	0.0	0.0	0.00
Trap:	0.0	0.0	0.00
impinger 7:	0.0	0.0	0.00
			31.20

O_2: 20.0
CO_2: 4.0

Start Time: 1601
Stop Time: 1708

Static Pressure (Port A):
Static Pressure (Port B):
Static Pressure (Avg.): -0.5

TRC Environmental Corp. EMISSION MEASUREMENTS DEPARTMENT

19874 141st Place N.E.
Woodinville, WA 98072
Phone: (425) 489-1938
Fax: (425) 489-9564

CLIENT:	Spectrum Glass Company	DATE:	11/24/03
LOCATION:	Woodinville, Washington	PROJECT NO.:	41613-0010-00000
UNIT:	Furnace #2	PERSONNEL:	DCT/MLE

Field Data Run Sheets

The table below contains the results of testing and calculations performed by TRC on the date(s) listed.

EPA Method 5 w/PSCAA Back-Half - Particulate Matter & Condensible Particulate Matter

RUN NO: Run 2
Minutes per point: 2.5
number of points: 24

PAGE ONE OF ONE
OPERATOR: Doug Towne

POINT NUMBER	TIME	DGM READING	VEL.	Sqrt	DIFF PRESS.		STACK TEMP.	DRY GAS METER TEMP (°F)	
		INITIAL	Dp (in. H_2O)	Dp	DH	Sqrt.	(°F)	INLET	OUTLET
A 1	0	134.610	0.07	0.265	1.50	1.225	166	58	58
2	3		0.07	0.265	1.50	1.225	164	58	58
3	5		0.07	0.265	1.50	1.225	160	58	58
4	8		0.07	0.265	1.50	1.225	154	60	58
5	10		0.07	0.265	1.50	1.225	153	61	58
6	13		0.07	0.265	1.50	1.225	153	63	58
7	15		0.07	0.265	1.50	1.225	152	64	58
8	18		0.07	0.265	1.50	1.225	152	65	59
9	20		0.07	0.265	1.50	1.225	152	66	60
10	23		0.06	0.245	1.30	1.140	151	67	60
11	25		0.06	0.245	1.30	1.140	151	67	61
12	28		0.07	0.265	1.50	1.225	151	68	61
B 1	30		0.04	0.200	0.84	0.917	147	65	62
2	33		0.06	0.245	1.30	1.140	153	65	63
3	35		0.07	0.265	1.52	1.233	154	66	63
4	38		0.07	0.265	1.51	1.229	155	68	63
5	40		0.08	0.283	1.72	1.311	157	69	63
6	43		0.07	0.265	1.51	1.229	159	69	63
7	45		0.07	0.265	1.51	1.229	156	70	64
8	48		0.07	0.265	1.51	1.229	156	70	64
9	50		0.09	0.300	2.00	1.414	155	71	65
10	53		0.08	0.283	1.74	1.319	154	71	65
11	55		0.08	0.283	1.80	1.342	154	71	65
12	58		0.09	0.300	2.00	1.414	154	71	65
	60	176.574							
	Total	Total	Avg.	Avg.	Avg.	Avg.	Avg.		Avg.
	60	41.964	0.07	0.265	1.523	1.231	154.7		63.6

Impinger Gain			
impinger 1:	714.9	709.2	5.70
impinger 2:	702.8	695.6	7.30
impinger 3:	705.1	703.9	1.20
impinger 4:	863.3	854.8	8.50
impinger 5:	0.0	0.0	0.00
Trap:	0.0	0.0	0.00
impinger 7:	0.0	0.0	0.00
			22.70

O_2: 20.0
CO_2: 4.0

Start Time: 1725
Stop Time: 1830

Static Pressure: -0.5

TRC Environmental Corp. EMISSION MEASUREMENTS DEPARTMENT

19874 141st Place N.E.
Woodinville, WA 98072
Phone: (425) 489-1938
Fax: (425) 489-9564

CLIENT:	Spectrum Glass Company	DATE:	11/24/03
LOCATION:	Woodinville, Washington	PROJECT NO.:	41613-0010-00000
UNIT:	Furnace #2	PERSONNEL:	DCT/MLE

Field Data Run Sheets

The table below contains the results of testing and calculations performed by TRC on the date(s) listed.

EPA Method 5 w/PSCAA Back-Half - Particulate Matter & Condensible Particulate Matter

RUN NO: Run 3
Minutes per point: 2.5
number of points: 24

PAGE ONE OF ONE
OPERATOR: Doug Towne

POINT NUMBER	TIME	DGM READING	VEL.	Sqrt	DIFF PRESS.		STACK TEMP.	DRY GAS METER TEMP (°F)	
		INITIAL	Dp (in. H_2O)	Dp	DH	Sqrt.	(°F)	INLET	OUTLET
B 1	0	176.649	0.05	0.224	1.10	1.049	151	65	65
2	3		0.04	0.200	0.87	0.933	150	65	65
3	5		0.04	0.200	0.88	0.938	147	65	65
4	8		0.04	0.200	0.88	0.938	147	66	65
5	10		0.07	0.265	1.55	1.245	148	68	65
6	13		0.07	0.265	1.55	1.245	147	69	65
7	15		0.06	0.245	1.30	1.140	147	70	65
8	18		0.08	0.283	1.75	1.323	147	71	65
9	20		0.09	0.300	1.95	1.396	146	71	65
10	23		0.09	0.300	2.00	1.414	146	72	65
11	25		0.09	0.300	2.00	1.414	146	72	66
12	28		0.09	0.300	2.00	1.414	146	72	66
A 1	30		0.07	0.265	1.55	1.245	144	70	66
2	33		0.07	0.265	1.55	1.245	144	70	66
3	35		0.07	0.265	1.55	1.245	144	71	66
4	38		0.07	0.265	1.55	1.245	144	71	66
5	40		0.07	0.265	1.55	1.245	146	72	66
6	43		0.07	0.265	1.55	1.245	146	73	66
7	45		0.07	0.265	1.55	1.245	146	73	67
8	48		0.07	0.265	1.55	1.245	145	74	67
9	50		0.06	0.245	1.30	1.140	145	74	67
10	53		0.06	0.245	1.30	1.140	144	74	67
11	55		0.07	0.265	1.55	1.245	144	74	67
12	58		0.06	0.245	1.30	1.140	144	74	68
	60	218.362							
	Total	Total	Avg.	Avg.	Avg.	Avg.	Avg.		Avg.
	60	41.713	0.07	0.258	1.487	1.211	146.0		66.3

Impinger Gain			
Impinger 1:	714.2	708.7	5.50
Impinger 2:	698.6	691.2	7.40
Impinger 3:	712.9	711.6	1.30
Impinger 4:	841.5	833.0	8.50
Impinger 5:	0.0	0.0	0.00
Trap:	0.0	0.0	0.00
Impinger 7:	0.0	0.0	0.00
			22.70

O_2: 20.0
CO_2: 4.0

Start Time: 1852
Stop Time: 2000

Static Pressure (Port A):
Static Pressure (Port B):
Static Pressure (Avg.): -0.5

TRC Environmental Corp.

EMISSION MEASUREMENTS DEPARTMENT

19874 141st Place N.E.
Woodinville, WA 98072
Phone: (425) 489-1938
Fax: (425) 489-9564

CLIENT: Spectrum Glass Company
LOCATION: Woodinville, Washington
UNIT: Furnace #2

DATE: 11/24/03
PROJECT NO.: 41613-0010-00000
PERSONNEL: DCT/MLE

Calculation Sheet

The table below contains the results of testing and calculations performed by TRC on the date(s) listed.

EPA Method 5 w/PSCAA Back-Half - Particulate Matter & Condensible Particulate Matter

Parameter	SYMBOL	UNITS				
Test Number			Run 1	Run 2	Run 3	
Test Date			11/24/03	11/24/03	11/24/03	
Start Time			1601	1725	1852	
Stop Time			1708	1830	2000	
Calculated Data						Average
Nozzle Area, An=3.14159*(dn/2)^2	An	square inches	0.1633	0.1269	0.1269	0.1391
Stack Area,As=3.14159*((Ds/12)/2)^2	As	square feet	7.47	7.47	7.47	7.47
Avg Stack Temperature, Ts=ts+460	Ts	degrees Rankin	627.5	614.7	606.0	616.1
Meter Pressure, Pm=Pb+Dh/13.6	Pm	inches Hg	29.98	29.88	29.88	29.91
Avg Meter Temperature, Tm=tm+460	Tm	degrees Rankin	518.9	523.6	528.3	523.6
Gas Sample Volume at Standard Conditions, Vm(std)= 528/29.92*Y*Vm*Pm/Tm	Vm(std)	cubic feet	56.576	41.924	41.302	46.601
		cubic meters	1.602	1.187	1.169	1.319
Net Moisture Gain (Impingers w/SiGel)	Ww	grams	31.2	22.7	22.7	25.5
Volume of Water Vapor, Vw(std)= 0.04715*Wlc	Vw(std)	cubic feet	1.471	1.070	1.070	1.204
Moisture Fraction, Bws = Vw(Std)/(Vm(Std)+Vw(Std))*100	Bws	percent	2.53%	2.49%	2.53%	2.52%
Dry Stack Gas Molecular Weight, Md = (0.32*O2)+(0.44*CO2)+(0.28*(100-(O2+CO2)))	Mwd	g/g-mole	29.44	29.44	29.44	29.44
Wet Stack Gas Molecular Weight Mw = Md* (1-Bws)+(18*(Bws))	Mws	g/g-mole	29.15	29.16	29.15	29.15
Absolute Stack Pressure, Ps = Pbar + Pg/13.6	Ps	inches Hg	29.73	29.73	29.73	29.73
Stack Gas Velocity Vs= 85.49*Cp*ASRdP*((Ts)/((Ps)*(Mw)))^0.5	Vs	ft/sec	16.71	16.00	15.50	16.07
Vsm = 0.3048* Vs	Vsm	m/sec	5.09	4.88	4.73	4.90
Actual Stack Gas Flow Rate, Qa = 60*Vs*As	Qa	acf/min	7488	7170	6946	7201
Stack Gas Flow Rate (STP), Qsw = 528/29.92 * Qa * (Ps/Ts)	Qsw	scf/min	6262	6120	6014	6132
Dry Stack Gas Flow Rate (Dry, STP), Qsd = 528/29.92 * Qa * (1-Bws)* (Ps/Ts)	Qsd	dscf/min	6103	5968	5862	5978
		dscm/min	173	169	166	169
Isokinetic Rate, I=100*As*Vm(std)/min*(An/144)*Qsd	I	percent	101.72	99.18	99.48	100.13
Meter Calibration (Alternate Method) Yqa=Min/Vm*((0.0319*Tm*29)/(DH@*(Pbar+dH/13.6)*Md))^0.5 *ASRdH	Yqa	none	1.0074	0.9958	0.9907	0.9979
Meter Quality Assurance/Quality Control Check =100*(Y-Yqa)/Y		% Difference	-1.6%	-0.4%	0.1%	-0.6% PASS

Sampling Data Summary

Parameter	SYMBOL	UNITS	Run 1	Run 2	Run 3	Average
Total Sampling Time	min	minutes	60	60	60	60
Stack Gas Oxygen Content	O_2	%	20.0	20.0	20.0	20.0
Stack Gas Carbon Dioxide Content	CO_2	%	4.0	4.0	4.0	4.0
Gas Sample Volume at Standard Conditions,	Vm(std)	cu. ft.	56.576	41.924	41.302	46.601
		cu. m.	1.602	1.187	1.169	1.319
Dry Stack Gas Flow Rate (Dry, STP),	Qsd	dscf/min	6103	5968	5862	5978
		dscm/min	173	169	166	169

TRC Environmental Corp. EMISSION MEASUREMENTS DEPARTMENT
19874 141st Place N.E.
Woodinville, WA 98072
Phone: (425) 489-1938
Fax: (425) 489-9564

CLIENT:	Spectrum Glass Company	DATE:	11/24/03
LOCATION:	Woodinville, Washington	PROJECT NO.:	41613-0010-00000
UNIT:	Furnace #2	PERSONNEL:	DCT/MLE

Particulate Emission Calculation Sheet

The table below contains the results of testing and calculations performed by TRC on the date(s) listed.

EPA Method 5 w/PSCAA Back-Half - Particulate Matter & Condensible Particulate Matter

Sampling Data Summary

Parameter	SYMBOL	UNITS	Run 1	Run 2	Run 3	Average
Total Sampling Time	min	minutes	60	60	60	60
Stack Gas Oxygen Content	O_2	percent	20.0	20.0	20.0	20.0
Stack Gas Carbon Dioxide Content	CO_2	percent	4.0	4.0	4.0	4.0
Gas Sample Volume at Standard Conditions,	Vm(std)	cubic feet	56.576	41.924	41.302	46.601
		cubic meters	1.602	1.187	1.169	1.319
Dry Stack Gas Flow Rate (Dry, STP),	Qsd	dscf/min	6103	5966	5862	5978
		dscm/min	172.8	169.0	165.9	169.2

Process Data Summary

Parameter	UNITS	Run 1	Run 2	Run 3	Average
Production Time	minutes	67	65	68	67
Glass Production	pounds	2,573	2,496	2,611	2,560
Glass Production Rate	kg/hr	1,046	1,046	1,046	1,046
Zero Production Rate Correction - Subpart CC (Zero Used to Prevent Negs.)	g/hr	0	0	0	0
Fuel Usage	cubic feet	2393.91	2231.45	2393.60	2339.65

Particulate Emissions Summary

Parameter	UNITS	Run 1	Run 2	Run 3	Average
Front-Half Particulate Matter (PM) Emissions					
Filter #	---	#110060	#110061	#110063	
Tare Weight of Filter	grams	0.3822	0.3813	0.3581	
Final Weight of Filter	grams	0.3822	0.3813	0.3582	
Net Weight of Particulate Matter	grams	0.0000	0.0000	0.0001	
Probe Rinse Section - Beaker #	---	#109	#508	#104	
Tare Weight of Beaker	grams	66.8768	66.9267	67.1173	
Final Weight of Beaker	grams	66.8809	66.9340	67.1217	
Net Weight of Particulate Matter	grams	0.0041	0.0073	0.0044	
Sample Volume	milliliters	30	30	30	
Weight/Volume of Acetone Blank	mg/ml	0.0000	0.0000	0.0000	
Net Weight of Particulate Matter due to Acetone	grams	0.0000	0.0000	0.0000	
Total Front-Half Particulate Matter	grams	0.0041	0.0073	0.0045	
Back-Half Condensible Particulate Matter (CPM) Emissions					
Organic Section - Beaker #	---	#53	#55	#71	
Tare Weight of Beaker	grams	65.1259	67.2222	68.7585	
Final Weight of Beaker	grams	65.1297	67.2281	68.7626	
Net Weight of Particulate Matter	grams	0.0038	0.0059	0.0041	
Sample Volume	milliliters	180	205	180	
Weight/Volume of CH_2Cl_2 Blank	mg/ml	0.0000	0.0000	0.0000	
Net Weight of Particulate Matter due to CH_2Cl_2	grams	0.0000	0.0000	0.0000	
Inorganic Section - Beaker #	---	#519	#522	#201	
Tare Weight of Beaker	grams	108.9628	108.9934	111.6543	
Final Weight of Beaker	grams	108.9643	108.9954	111.6570	
Net Weight of Particulate Matter	grams	0.0015	0.0020	0.0027	
Volume of Impinger Contents	milliliters	490	410	430	
Weight/Volume of DI H_2O Blank	mg/ml	0.0000	0.0000	0.0000	
Weight/Volume of Particulate Matter Due to DI H_2O	grams	0.0000	0.0000	0.0000	
Total Back-Half Particulate Matter	grams	0.0053	0.0079	0.0068	
Total PM & CPM Emissions					
Total Net Weight of PM & CPM	mg	9.4	15.2	11.3	12.0
Emission Concentration	g/dscm	0.006	0.013	0.010	0.009
Emission Concentration	gr/dscf	0.003	0.006	0.004	0.004
Emission Rate (Per 40CFR60 Subpart CC w/o Zero Flat Glass Correction)	g/kg	0.058	0.124	0.092	0.091
Emission Rate	lb/hr	0.134	0.286	0.212	0.210
Emission Rate (assumes 24 hour per day operation)	lb/day	3.21	6.85	5.08	5.05

TRC

TEST DATA SUMMARIES

Client: Spectrum Glass Company
Location: Woodinville, Washington
Unit: Furnace #4

EPA Method 5 w/PSCAA Back-Half - Particulate Matter & Condensible Particulate Matter

	Run 1	Run 2	Run 3
Dates:	11/24/03	11/24/03	11/24/03
Barometric Pressures:	29.77	29.77	29.77

TABLE OF CONTENTS:

Sampling Data Summary					
Parameter	Run 1	Run 2	Run 3		Average
Total Sampling Time, Min.	60	60	60		60
Stack Gas Oxygen Content, O2%	20.0	20.0	20.0		20.0
Stack Gas Carbon Dioxide Content, CO2%	4.0	4.0	4.0		4.0
Gas Sample Volume at Standard Conditions, cu. ft.	38.711	37.103	36.510		37.441
cu. m.	1.096	1.050	1.034		1.060
Dry Stack Gas Flow Rate (Dry, STP), dscf/min	4,712	4,674	4,692		4,693
dscm/min	133	132	133		133

TRC Environmental Corporation
19874 141st Place N.E.
Woodinville, WA 98072
Phone: (425) 489-1938
Fax: (425) 489-9564

Project Number **41613-0010-00000**

TRC Environmental Corp.

EMISSION MEASUREMENTS DEPARTMENT

19874 141st Place N.E.
Woodinville, WA 98072
Phone: (425) 489-1938
Fax: (425) 489-9564

CLIENT:	Spectrum Glass Company	DATE: 11/24/03
LOCATION:	Woodinville, Washington	PROJECT NO.: 41613-0010-00000
UNIT:	Furnace #4	PERSONNEL: PJC/MLE

Data Input Sheet

The table below contains the results of testing and calculations performed by TRC on the date(s) listed.

EPA Method 5 w/PSCAA Back-Half - Particulate Matter & Condensible Particulate Matter

Parameter	SYMBOL	UNITS				
Test Number			Run 1	Run 2	Run 3	
Test Date			11/24/03	11/24/03	11/24/03	
Start Time			1601	1010	1852	
Stop Time			1708	1112	2000	**Average**
Stack Diameter	ds	inches	40	40	40	
Nozzle Diameter	dn	inches	0.456	0.456	0.456	
Barometric Pressure	Pbar	inches Hg	29.77	29.77	29.77	29.77
Stack Static Pressure	Pg	inches H_2O	-0.09	-0.09	-0.08	-0.09
Pitot Coefficient	cp	none	0.84	0.84	0.84	0.84
Meter Calibration Factor	Y	none	0.992	0.992	0.992	
	DH@	none	1.719	1.719	1.719	
Stack Gas Oxygen Content	O_2	percent	20.0	20.0	20.0	20.0
Stack Gas Carbon Dioxide Content	CO_2	percent	4.0	4.0	4.0	4.0
Net Moisture Gain (Impingers w/SiGel)	Ww	grams	43.4	43.8	42.0	43.1
Average Stack Temperature	ts	degrees F	225.5	221.3	225.8	224.2
Average Meter Temperature	tm	degrees F	56.5	60.3	60.4	59.1
Avg Delta H	dH	inches H_2O	1.258	1.175	1.198	1.210
Average Square Root Delta H	ASR dH	inches H_2O	1.121	1.081	1.092	1.098
Avg Velocity Head	dP	inches H_2O	0.039	0.037	0.037	0.037
Average Square Root Delta P	ASR dP	inches H_2O	0.193	0.191	0.192	0.192
Gas Sample Volume	Vm	cubic feet	38.248	36.935	36.347	37.177
Total Sampling Time	min	minutes	60	60	60	

TRC Environmental Corp.

EMISSION MEASUREMENTS DEPARTMENT

19874 141st Place N.E.
Woodinville, WA 98072
Phone: (425) 489-1938
Fax: (425) 489-9564

CLIENT:	Spectrum Glass Company	DATE:	11/24/03
LOCATION:	Woodinville, Washington	PROJECT NO.:	41613-0010-00000
UNIT:	Furnace #4	PERSONNEL:	PJC/MLE

Field Data Run Sheets

The table below contains the results of testing and calculations performed by TRC on the date(s) listed.

EPA Method 5 w/PSCAA Back-Half - Particulate Matter & Condensible Particulate Matter

RUN NO: Run 1 — PAGE ONE OF ONE
Minutes per point: 2.5 — OPERATOR: Paul Clark
number of points: 24

POINT NUMBER	TIME	DGM READING	VEL.	Sqrt	DIFF PRESS.		STACK TEMP.	DRY GAS METER TEMP (°F)	
		INITIAL	Dp (in. H_2O)	Dp	DH	Sqrt.	(°F)	INLET	OUTLET
B 1	0	931.945	0.04	0.200	1.30	1.140	220	52	52
2	3		0.04	0.200	1.30	1.140	224	51	51
3	5		0.04	0.200	1.30	1.140	226	52	52
4	8		0.04	0.200	1.30	1.140	227	55	53
5	10		0.04	0.200	1.30	1.140	227	57	54
6	13		0.04	0.200	1.30	1.140	227	58	55
7	15		0.04	0.200	1.30	1.140	227	57	54
8	18		0.04	0.200	1.30	1.140	227	58	54
9	20		0.04	0.200	1.30	1.140	227	57	54
10	23		0.04	0.200	1.30	1.140	227	57	54
11	25		0.04	0.200	1.30	1.140	225	57	54
12	28		0.04	0.200	1.30	1.140	225	57	54
A 1	30		0.03	0.080	0.96	0.980	223	58	55
2	33		0.03	0.173	0.96	0.980	224	58	56
3	35		0.04	0.200	1.30	1.140	226	60	56
4	38		0.04	0.200	1.30	1.140	226	60	56
5	40		0.04	0.200	1.30	1.140	226	60	57
6	43		0.04	0.200	1.30	1.140	227	60	58
7	45		0.04	0.200	1.30	1.140	227	60	57
8	48		0.04	0.200	1.30	1.140	227	60	57
9	50		0.04	0.200	1.30	1.140	226	61	58
10	53		0.04	0.200	1.30	1.140	226	61	58
11	55		0.04	0.200	1.30	1.140	223	61	58
12	58		0.03	0.173	0.98	0.990	221	61	58
	60	970.193							
	Total	Total	Avg.	Avg.	Avg.	Avg.	Avg.		Avg.
	60	38.248	0.04	0.193	1.258	1.121	225.5		56.5

Impinger Gain

impinger 1:	724.8	705.6	19.20
impinger 2:	709.1	697.7	11.40
impinger 3:	714.0	711.5	2.50
impinger 4:	902.1	891.8	10.30
impinger 5:	0.0	0.0	0.00
Trap:	0.0	0.0	0.00
impinger 7:	0.0	0.0	0.00
			43.40

O_2: 20.0
CO_2: 4.0

Start Time: 0850
Stop Time: 0953

Static Pressure (Port A): _____
Static Pressure (Port B): _____
Static Pressure (Avg.): -0.09

TRC Environmental Corp. EMISSION MEASUREMENTS DEPARTMENT

19874 141st Place N.E.
Woodinville, WA 98072
Phone: (425) 489-1938
Fax: (425) 489-9564

CLIENT:	Spectrum Glass Company	DATE:	11/24/03
LOCATION:	Woodinville, Washington	PROJECT NO.:	41613-0010-00000
UNIT:	Furnace #4	PERSONNEL:	PJC/MLE

Field Data Run Sheets

The table below contains the results of testing and calculations performed by TRC on the date(s) listed.

EPA Method 5 w/PSCAA Back-Half - Particulate Matter & Condensible Particulate Matter

RUN NO: Run 2
Minutes per point: 2.5
number of points: 24

PAGE ONE OF ONE
OPERATOR: Matt Ellis

POINT NUMBER	TIME	DGM READING	VEL.	Sqrt	DIFF PRESS.		STACK TEMP.	DRY GAS METER TEMP (°F)	
		INITIAL	Dp (in. H_2O)	Dp	DH	Sqrt.	(°F)	INLET	OUTLET
A 12	0	970.328	0.04	0.200	1.30	1.140	219	57	57
11	3		0.04	0.200	1.30	1.140	219	57	57
10	5		0.04	0.200	0.93	0.964	224	58	57
9	8		0.03	0.173	0.96	0.980	226	59	57
8	10		0.04	0.200	1.30	1.140	227	59	57
7	13		0.03	0.173	0.96	0.980	227	60	57
6	15		0.04	0.200	1.30	1.140	227	60	57
5	18		0.04	0.200	1.30	1.140	227	61	57
4	20		0.04	0.200	1.30	1.140	220	61	58
3	23		0.04	0.200	1.30	1.140	217	62	58
2	25		0.04	0.200	1.30	1.140	216	63	58
1	28		0.04	0.200	1.30	1.140	216	63	60
B 12	30		0.03	0.173	0.98	0.990	220	61	60
11	33		0.03	0.173	0.97	0.985	223	62	60
10	35		0.03	0.173	0.97	0.985	223	62	60
9	38		0.03	0.173	0.97	0.985	223	62	60
8	40		0.04	0.200	1.30	1.140	225	63	61
7	43		0.04	0.200	1.30	1.140	227	64	61
6	45		0.04	0.200	1.30	1.140	225	65	61
5	48		0.04	0.200	1.30	1.140	225	64	61
4	50		0.03	0.173	0.98	0.990	217	64	61
3	53		0.03	0.173	0.98	0.990	217	63	61
2	55		0.04	0.200	1.30	1.140	211	62	64
1	58		0.04	0.200	1.30	1.140	211	61	61
	60	1007.263							
	Total	Total	Avg.	Avg.	Avg.	Avg.	Avg.		Avg.
	60	36.935	0.04	0.191	1.175	1.081	221.3		60.3

Impinger Gain

impinger 1:	725.5	704.2	21.30
impinger 2:	701.5	691.5	10.00
impinger 3:	716.9	714.7	2.20
impinger 4:	938.4	928.1	10.30
impinger 5:	0.0	0.0	0.00
Trap:	0.0	0.0	0.00
impinger 7:	0.0	0.0	0.00
			43.80

O_2: 20.0
CO_2: 4.0

Start Time: 1010
Stop Time: 1112

Static Pressure: -0.09

TRC Environmental Corp. EMISSION MEASUREMENTS DEPARTMENT
19874 141st Place N.E.
Woodinville, WA 98072
Phone: (425) 489-1938
Fax: (425) 489-9564

CLIENT:	Spectrum Glass Company	DATE:	11/24/03
LOCATION:	Woodinville, Washington	PROJECT NO.:	41613-0010-00000
UNIT:	Furnace #4	PERSONNEL:	PJC/MLE

Field Data Run Sheets

The table below contains the results of testing and calculations performed by TRC on the date(s) listed.

EPA Method 5 w/PSCAA Back-Half - Particulate Matter & Condensible Particulate Matter

RUN NO: Run 3
Minutes per point: 2.5
number of points: 24
PAGE ONE OF ONE
OPERATOR: Matt Ellis

POINT NUMBER	TIME	DGM READING	VEL.	Sqrt	DIFF PRESS.		STACK TEMP.	DRY GAS METER TEMP (°F)	
		INITIAL	Dp (in. H_2O)	Dp	DH	Sqrt.	(°F)	INLET	OUTLET
SW 12	0	1007.313	0.04	0.200	1.30	1.140	220	58	58
11	3		0.04	0.200	1.30	1.140	224	59	60
10	5		0.04	0.200	1.30	1.140	226	60	60
9	8		0.04	0.200	1.30	1.140	226	61	60
8	10		0.04	0.200	1.30	1.140	226	62	60
7	13		0.04	0.200	1.30	1.140	226	62	60
6	15		0.04	0.200	1.30	1.140	226	62	60
5	18		0.03	0.173	0.97	0.985	226	63	60
4	20		0.04	0.200	1.30	1.140	227	64	61
3	23		0.04	0.200	1.30	1.140	226	62	60
2	25		0.03	0.173	0.97	0.985	226	62	60
1	28		0.03	0.173	0.97	0.985	226	62	60
NW 12	30		0.03	0.173	0.97	0.985	225	60	60
11	33		0.03	0.173	0.97	0.985	224	60	60
10	35		0.04	0.200	1.30	1.140	224	60	60
9	38		0.04	0.200	1.30	1.140	224	60	60
8	40		0.03	0.173	0.97	0.985	227	60	59
7	43		0.04	0.200	1.25	1.118	229	60	60
6	45		0.04	0.200	1.25	1.118	229	60	60
5	48		0.04	0.200	1.25	1.118	229	61	60
4	50		0.04	0.200	1.30	1.140	229	61	60
3	53		0.04	0.200	1.30	1.140	227	61	59
2	55		0.04	0.200	1.30	1.140	224	61	59
1	58		0.03	0.173	0.97	0.985	222	61	59
	60	1043.660							
	Total	Total	Avg.	Avg.	Avg.	Avg.	Avg.		Avg.
	60	36.347	0.04	0.192	1.198	1.092	225.8		60.4

Impinger Gain			
Impinger 1:	709.0	702.2	6.80
Impinger 2:	701.7	693.5	8.20
Impinger 3:	720.8	707.7	13.10
Impinger 4:	854.8	840.9	13.90
Impinger 5:	0.0	0.0	0.00
Trap:	0.0	0.0	0.00
Impinger 7:	0.0	0.0	0.00
			42.00

O_2: 20.0
CO_2: 4.0

Start Time: 1852
Stop Time: 2000

Static Pressure (Port A):
Static Pressure (Port B):
Static Pressure (Avg.): -0.08

TRC Environmental Corp.

EMISSION MEASUREMENTS DEPARTMENT

19874 141st Place N.E.
Woodinville, WA 98072
Phone: (425) 489-1938
Fax: (425) 489-9564

CLIENT: Spectrum Glass Company — DATE: 11/24/03
LOCATION: Woodinville, Washington — PROJECT NO.: 41613-0010-00000
UNIT: Furnace #4 — PERSONNEL: PJC/MLE

Calculation Sheet

The table below contains the results of testing and calculations performed by TRC on the date(s) listed.

EPA Method 5 w/PSCAA Back-Half - Particulate Matter & Condensible Particulate Matter

Parameter	SYMBOL	UNITS				
Test Number			Run 1	Run 2	Run 3	
Test Date			11/24/03	11/24/03	11/24/03	
Start Time			1601	1010	1852	
Stop Time			1708	1112	2000	
Calculated Data						Average
Nozzle Area, An=3.14159*(dn/2)^2	An	square inches	0.1633	0.1633	0.1633	0.1633
Stack Area,As=3.14159*((Ds/12)/2)^2	As	square feet	8.73	8.73	8.73	8.73
Avg Stack Temperature, Ts=ts+460	Ts	degrees Rankin	685.5	681.3	685.8	684.2
Meter Pressure, Pm=Pb+Dh/13.6	Pm	inches Hg	29.86	29.86	29.86	29.86
Avg Meter Temperature, Tm=tm+460	Tm	degrees Rankin	516.5	520.3	520.4	519.1
Gas Sample Volume at Standard Conditions, Vm(std)= 528/29.92*Y*Vm*Pm/Tm	Vm(std)	cubic feet	38.711	37.103	36.510	37.441
		cubic meters	1.096	1.050	1.034	1.060
Net Moisture Gain (Impingers w/SiGel)	Ww	grams	43.4	43.8	42.0	43.1
Volume of Water Vapor, Vw(std)= 0.04715*Wlc	Vw(std)	cubic feet	2.046	2.065	1.980	2.031
Moisture Fraction, Bws = Vw(Std)/(Vm(Std)+Vw(Std))*100	Bws	percent	5.02%	5.27%	5.14%	5.15%
Dry Stack Gas Molecular Weight, Md = (0.32*O2)+(0.44*CO2)+(0.28*(100-(O2+CO2)))	Mwd	g/g-mole	29.44	29.44	29.44	29.44
Wet Stack Gas Molecular Weight Mw = Md* (1-Bws)+(18*(Bws))	Mws	g/g-mole	28.87	28.84	28.85	28.85
Absolute Stack Pressure, Ps = Pbar + Pg/13.6	Ps	inches Hg	29.76	29.76	29.76	29.76
Stack Gas Velocity Vs= 85.49*Cp*ASRdP*((Ts)/((Ps)*(Mw)))^0.5	Vs	ft/sec	12.36	12.22	12.33	12.31
Vsm = 0.3048* Vs	Vsm	m/sec	3.77	3.73	3.76	3.75
Actual Stack Gas Flow Rate, Qa = 60*Vs*As	Qa	acf/min	6474	6401	6458	6444
Stack Gas Flow Rate (STP), Qsw = 528/29.92 * Qa * (Ps/Ts)	Qsw	scf/min	4961	4934	4946	4947
Dry Stack Gas Flow Rate (Dry, STP), Qsd = 528/29.92 * Qa * (1-Bws)* (Ps/Ts)	Qsd	dscf/min	4712	4674	4692	4693
		dscm/min	133	132	133	133
Isokinetic Rate, I=100*As*Vm(std)/min*(An/144)*Qsd	I	percent	105.36	101.80	99.80	102.32
Meter Calibration (Alternate Method) Yqa=Min/Vm*((0.0319*Tm*29)/(DH@*(Pbar+dH/13.6)*Md))^0.5 *ASRdH	Yqa	none	0.9884	0.9914	1.0176	0.9991
Meter Quality Assurance/Quality Control Check =100*(Y-Yqa)/Y		% Difference	0.4%	0.1%	-2.6%	-0.7% PASS

Sampling Data Summary

Parameter	SYMBOL	UNITS	Run 1	Run 2	Run 3	Average
Total Sampling Time	min	minutes	60	60	60	60
Stack Gas Oxygen Content	O_2	%	20.0	20.0	20.0	20.0
Stack Gas Carbon Dioxide Content	CO_2	%	4.0	4.0	4.0	4.0
Gas Sample Volume at Standard Conditions,	Vm(std)	cu. ft.	38.711	37.103	36.510	37.441
		cu. m.	1.096	1.050	1.034	1.060
Dry Stack Gas Flow Rate (Dry, STP),	Qsd	dscf/min	4712	4674	4692	4693
		dscm/min	133	132	133	133

TRC Environmental Corp.

EMISSION MEASUREMENTS DEPARTMENT

19874 141st Place N.E.
Woodinville, WA 98072
Phone: (425) 489-1938
Fax: (425) 489-9564

CLIENT: Spectrum Glass Company — DATE: 11/24/03
LOCATION: Woodinville, Washington — PROJECT NO.: 41613-0010-00000
UNIT: Furnace #4 — PERSONNEL: PJC/MLE

Particulate Emission Calculation Sheet

The table below contains the results of testing and calculations performed by TRC on the date(s) listed.

EPA Method 5 w/PSCAA Back-Half - Particulate Matter & Condensible Particulate Matter

Sampling Data Summary

Parameter	SYMBOL	UNITS	Run 1	Run 2	Run 3	Average
Total Sampling Time	min	minutes	60	60	60	60
Stack Gas Oxygen Content	O_2	percent	20.0	20.0	20.0	20.0
Stack Gas Carbon Dioxide Content	CO_2	percent	4.0	4.0	4.0	4.0
Gas Sample Volume at Standard Conditions,	Vm(std)	cubic feet	38.711	37.103	36.510	37.441
		cubic meters	1.096	1.050	1.034	1.060
Dry Stack Gas Flow Rate (Dry, STP),	Qsd	dscf/min	4712	4674	4692	4693
		dscm/min	133.4	132.3	132.8	132.8

Process Data Summary

Parameter	UNITS	Run 1	Run 2	Run 3	Average
Production Time	minutes	63	62	63	63
Glass Production	pounds	2199	2164	2199	2187
Glass Production Rate	kg/hr	950.8	950.8	950.8	950.8
Zero Production Rate Correction - Subpart CC (Zero Used to Prevent Negs.)	g/hr	0	0	0	0
Fuel Usage	cubic feet	2561.58	2231.45	2393.60	2395.54

Particulate Emissions Summary

Parameter	UNITS	Run 1	Run 2	Run 3	Average
Front-Half Particulate Matter (PM) Emissions					
Filter #	---	#110056	#110057	#110058	
Tare Weight of Filter	grams	0.3859	0.3851	0.3843	
Final Weight of Filter	grams	0.3859	0.3851	0.3843	
Net Weight of Particulate Matter	grams	0.0000	0.0000	0.0000	
Probe Rinse Section - Beaker #	---	#106	#110	#111	
Tare Weight of Beaker	grams	66.8984	65.3105	67.0751	
Final Weight of Beaker	grams	66.9058	65.3150	67.0823	
Net Weight of Particulate Matter	grams	0.0074	0.0045	0.0072	
Sample Volume	milliliters	40	40	40	
Weight/Volume of Acetone Blank	mg/ml	0.0000	0.0000	0.0000	
Net Weight of Particulate Matter due to Acetone	grams	0.0000	0.0000	0.0000	
Total Front-Half Particulate Matter	grams	0.0074	0.0045	0.0072	
Back-Half Condensible Particulate Matter (CPM) Emissions					
Organic Section - Beaker #	---	#100	#101	#102	
Tare Weight of Beaker	grams	67.1051	65.4323	67.2011	
Final Weight of Beaker	grams	67.1076	65.4363	67.2040	
Net Weight of Particulate Matter	grams	0.0025	0.0040	0.0029	
Sample Volume	milliliters	190	210	175	
Weight/Volume of CH_2Cl_2 Blank	mg/ml	0.0000	0.0000	0.0000	
Net Weight of Particulate Matter due to CH_2Cl_2	grams	0.0000	0.0000	0.0000	
Inorganic Section - Beaker #	---	#203	#204	#205	
Tare Weight of Beaker	grams	109.7129	110.9983	111.6707	
Final Weight of Beaker	grams	109.7132	110.9993	111.6739	
Net Weight of Particulate Matter	grams	0.0003	0.0010	0.0032	
Volume of Impinger Contents	milliliters	400	380	445	
Weight/Volume of DI H_2O Blank	mg/ml	0.0000	0.0000	0.0000	
Weight/Volume of Particulate Matter Due to DI H_2O	grams	0.0000	0.0000	0.0000	
Total Back-Half Particulate Matter	grams	0.0028	0.0050	0.0061	
Total PM & CPM Emissions					
Total Net Weight of PM & CPM	mg	10.2	9.5	13.3	11.0
Emission Concentration	g/dscm	0.009	0.009	0.013	0.010
Emission Concentration	gr/dscf	0.004	0.004	0.006	0.005
Emission Rate (Per 40CFR60 Subpart CC w/o Zero Flat Glass Correction)	g/kg	0.078	0.076	0.108	0.087
Emission Rate	lb/hr	0.164	0.158	0.226	0.182
Emission Rate (assumes 24 hour per day operation)	lb/day	3.93	3.79	5.41	4.38

APPENDIX B

SPECTRUM GLASS COMPANY PROCESS DATA

	Spectrum Glass Process Data- Furnace 4				F Daytank					Date: 11/24/2003		
Time	F4 Draw at Hood	F4 Draw at Crossover	F4 Damper Position	F4 burner Output %	Fd/t Draw at Hood	Fd/t Damper Position	Fd/t burner Output %	Baghouse Temp.	Outlet Temp.	Frequency	Blower Static Press.	Drop across Bags (dp)
1A	0.40	0.60	Open	38	DFR	DFR	DFR	348	274	45.0	6.50	5.20
2A	0.35	0.60	Open	34	DFR	DFR	DFR	348	274	45.0	6.50	5.20
3A	0.35	0.60	Open	38	DFR	DFR	DFR	363	279	45.0	6.50	5.30
4A	0.40	0.60	Open	0	DFR	DFR	DFR	379	289	45.0	6.50	5.30
5A	0.35	0.60	1/2 Open	40	DFR	DFR	DFR	350	271	45.0	6.50	5.25
6A	0.35	0.50	1/2 Open	49	DFR	DFR	DFR	349	271	45.0	6.50	5.35
7A	0.35	0.50	1/2 Open	50	DFR	DFR	DFR	348	269	45.0	6.50	5.45
8A	0.35	0.50	1/2 Open	52	DFR	DFR	DFR	349	269	45.0	6.50	5.50
9A	0.35	0.50	1/2 Open	47	DFR	DFR	DFR	348	267	45.0	6.50	5.50
10A	0.35	0.50	1/2 Open	51	DFR	DFR	DFR	348	269	45.0	6.50	5.50
11A	0.35	0.50	1/2 Open	53	DFR	DFR	DFR	350	269	45.0	6.50	5.50
12P	0.35	0.50	1/2 Open	56	DFR	DFR	DFR	349	270	45.0	6.50	5.50
1P	0.35	0.50	3/4 Open	100	DFR	DFR	DFR	349	270	45.0	6.75	5.50
2P	0.35	0.50	1/2 Open	100	DFR	DFR	DFR	350	273	45.0	7.00	5.50
3P	0.40	0.50	1/2 Open	100	DFR	DFR	DFR	350	270	45.0	7.00	5.50
4P	0.35	0.50	1/2 Open	100	DFR	DFR	DFR	349	271	45.0	7.00	5.50
5P	0.35	0.50	1/2 Open	100	DFR	DFR	DFR	347	270	45.0	6.90	5.50
6P	0.35	0.50	1/2 Open	100	DFR	DFR	DFR	349	269	45.0	6.90	5.50
7P	0.35	0.50	5/8 Open	100	DFR	DFR	DFR	349	266	45.0	6.90	5.50
8P	0.35	0.50	5/8 Open	100	DFR	DFR	DFR	349	268	45.0	6.50	5.60
9P	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
10P	0.35	0.50	Open	34	DFR	DFR	DFR	349	262	45.0	6.50	5.60
11P	0.35	0.50	Open	29	DFR	DFR	DFR	348	261	45.0	6.50	5.60
12A	0.35	0.50	Open	29	DFR	DFR	DFR	348	261	45.0	6.50	5.60
							Average	351	270			
							Standard Deviation	6.7	5.7			

Furnace No. 4 Sum 9-Noon	
9 to Noon Avgs	11/24/2003
BH DP	Temp in °F
5.50	349

Spectrum Glass Process Recordings					Date: 11/24/03		
Time	Frequency	Inlet Temp.	Drop Across Bags (dp)	Blower Static Press.	F2 Burner Output %	F2 Damper Position	F2 Hood Draw
1:00 AM	37.4	213	4.90	7.5	100	1/2 Open	0.75
2:00 AM	38.2	226	5.00	7.5	100	1/2 Open	0.75
3:00 AM	38.5	225	5.00	7.5	100	1/2 Open	0.75
4:00 AM	38.1	234	5.00	7.5	100	1/2 Open	0.75
5:00 AM	35.1	230	4.10	6.5	100	1/2 Open	0.9
6:00 AM	36.6	212	4.50	7.0	100	1/2 Open	0.9
7:00 AM	37.3	191	4.50	7.0	40	1/2 Open	0.9
8:00 AM	36.8	176	5.00	7.2	17	1/2 Open	0.9
9:00 AM	36.7	202	4.80	7.2	19	Open	0.9
10:00 AM	38.6	264	5.00	7.2	45	Open	0.9
11:00 AM	38.6	270	5.00	7.3	49	Open	0.9
12:00 PM	38.9	273	5.00	7.3	45	Open	0.9
1:00 PM	38.6	263	5.00	7.5	0	Open	0.75
2:00 PM	38.5	240	5.00	7.5	0	Open	0.75
3:00 PM	38.2	229	5.00	7.5	64	1/2 Open	0.75
4:00 PM	37.8	238	4.75	7.5	45	1/2 Open	0.75
5:00 PM	37.2	216	4.75	7.5	46	1/2 Open	0.75
6:00 PM	35.4	211	4.25	6.5	49	1/2 Open	0.75
7:00 PM	36.0	210	4.25	6.5	45	1/2 Open	0.75
8:00 PM	36.4	208	4.25	6.5	49	1/2 Open	0.75
9:00 PM	N/A	N/A	N/A	N/A	N/A	N/A	N/A
10:00 PM	34.5	214	4.00	6.5	100	1/2 Open	0.75
11:00 PM	35.1	216	4.00	6.5	100	1/2 Open	0.75
12:00 AM	34.8	206	4.00	6.5	100	1/2 Open	0.75
		225	Average				
		24.3	Standard Deviation				

Furnace No. 2 Summary	
4 to 8 PM Avgs	11/24/2003
BH DP	Temp in °F
4.45	217

APPENDIX C

MANUAL CALCULATIONS & FIELD DATA

EPA Methods 1, 2, 3A, 4 & 5 Example Calculations

Client: SPECTRUM GLASS COMPANY
Location: Woodinville, WA
Site Location: #2 Furnace
Run #: 2
Date: 11-24-03

Nomenclature:

A_d = cross-sectional area of stack, ft.^{2}
A_n = cross-sectional area of nozzle, ft^2
B_{ws} = water vapor in the gas stream, proportion by volume
C_p = pitot tube coefficient, dimensionless
K_p = pitot tube constant = 85.49 ft/sec $\sqrt{\frac{(\text{lb/lb-mole})(\text{inches Hg})}{(^\circ\text{R})(\text{inches } H_2O)}}$
M_d = molecular weight of stack gas, dry basis, lb./lb.-mole
M_s = molecular weight of stack gas, wet basis, lb./lb.-mole
$= M_d(1 - B_{ws}) + 18(B_{ws})$
$\sqrt{\Delta P}_{avg}$ = average velocity head of stack gas, $\sqrt{\text{inches } H_2O}$
P_s = absolute stack gas pressure, inches Hg
P_{static} = static pressure of the stack, inches H_2O
P_{std} = standard absolute pressure, 29.92 inches Hg
Q_{std} = stack flow rate, dscfh
θ = sample time, minutes
T_s = average stack temperature, °F
T_{std} = standard absolute temperature, 528°R
$T_{s(avg)}$ = Average absolute stack temperature, °R = 460 + T_s
V_{mstd} = corrected meter volume, dscf
V_S = average stack gas velocity, ft./sec.
V_{lc} = volume of water gain in the impingers, ml

1. Volume of metered sample gas at standard conditions:

$$P_{meter} = P_{bar} + \frac{\Delta H}{13.6} = \frac{29.77}{} + \frac{1.523}{13.6} = \frac{29.88}{} \text{ inches Hg}$$

$$V_{m(std)} = \frac{(V_m)(T_{std})(P_{meter})(Y)}{(T_m + 460)(P_{std})}$$

$$V_{m(std)} = \frac{(41.964)(528)(29.88)(0.992)}{(63.6 + 460)(29.92)} = \frac{41.924}{} \text{ dscf}$$

2. Moisture Content:

$V_{w(std)} = (0.04707\ ft^3/gram\ water)(V_{lc})$ 1 gram water ≡ 1 ml water

$V_{w(std)} = (0.04707)(\ 22.7\ ) = 1.0685$ scf

$$B_{ws} = \frac{V_{w(std)}}{V_{w(std)} + V_{m(std)}}$$

$$B_{ws} = \frac{1.0685}{1.0685 + 41.924} = 0.0249 \text{ water vapor fraction}$$

$0.0249 \times 100\% = 2.49\%$ moisture

3. Molecular Weight:

Dry:

$M_d = (0.44 * \%CO_2) + (0.32 * \%O_2) + [0.28 * (100 - \%CO_2 - \%O_2)]$

$= (0.44 * (\ 4.0\ ) + (0.32 * (\ 20.0\ ) + 0.28 * (100 - 4.0 - 20.0\ )$

$= 29.44$ lb/lb-mole

Wet:

$M_w = M_d * (1 - B_{ws}) + [18 * (B_{ws})]$

$= (\ 29.44\ ) * (1 - 0.0249) + [18 * (0.0249)]$

$= 29.16$ lb/lb-mole

4. Average Velocity of Stack Gas:

$$V_s = K_p * C_p * \sqrt{\Delta P_{avg}} \sqrt{\frac{T_{s(avg)}}{M_w * P_s}} \qquad P_s = P_{bar} + \frac{P_{static}}{13.6}$$

$$P_s = 29.77 + \frac{-0.50}{13.6} = 29.73$$

$$V_s = 85.49 * 0.84 * 0.265 \sqrt{\frac{614.7}{29.16 * 29.73}} = 16.00 \text{ ft/sec}$$

as gr/dscf:

0.0154 = conversion of mg to grains (gr)
1/7000 = conversion of grains to pounds
M_n = weight of particulate in mg

$$C_s = \frac{0.0154 * M_n}{V_{m(std)}} = \frac{0.0154 * 15.2}{41.924} = \underline{0.006} \text{ gr/dscf}$$

as gr/dscf @ 7% O_2:

$$C_s = \frac{(C_s \text{ as gr/dscf}) * (20.9 - 7)}{(20.9 - O_{2\text{measured}})} = \frac{* 13.9}{(20.9 - \_\_\_\_)}$$

$$= \underline{NA} \text{ gr/dscf @ 7\% } O_2$$

as g/kg

E = Emission Rate of particulate matter, g/kg
C_s = concentration of particulate matter, g/dscm
Q_{std} = volumetric flow rate, dscm/hr
A = zero production rate correction, 454 g/hr for flat glass (per Subpart CC)
P = glass production rate, kg/hr

$$E = (C_s Q_{std} - A)/P$$

$$= \frac{0.013 \text{ g/dscm} * 10140 \text{ dscm/hr} - \emptyset \text{ g/hr}}{1045.1 \text{ kg/hr}}$$

~~A~~ used zero (Ø) for this calculation

$$= \underline{0.124} \text{ g/kg}$$

$15.2 \text{ mg} \times \frac{1 \text{mg}}{1000 \text{g}} \times \frac{1}{1.187 \text{ dscm}}$

$\frac{\text{dscm}}{\text{hr}} = 169.0 \frac{\text{dscm}}{\text{min}} \times 60 \frac{\text{min}}{\text{hr}}$

$= 10140 \frac{\text{dscm}}{\text{hr}}$

as lb/hour:

$$C_s = \frac{(C_s \text{ as gr/dscf}) * Q_{std} * 60}{7000} = \frac{0.006 * 5968 * 60}{7000}$$

$$= \underline{0.286} \text{ lb/hour}$$

as lb/day

$$\underline{0.286} \text{ lb/hr} * \underline{\quad} \text{ hr/day} = \underline{6.85} \text{ lb/day}$$

$\frac{\text{Kg}}{\text{hr}} = 2496 \frac{\text{lbs glass production}}{} \times \frac{1 \text{ kg}}{2.204622 \text{ lb}} \times \frac{1}{65 \text{ min}} \times 60 \frac{\text{min}}{\text{hr}} = 1045.1 \frac{\text{kg}}{\text{hr}}$

g/kg using Subpart CC zero production correction

$$\frac{0.013 \text{ g/dscm} \times 10140 \text{ dscm/hr} - 454 \text{ g/hr}}{1045.1 \text{ kg/hr}} = 0.0 \text{ g/kg}$$

5. Stack Gas Volumetric Flow Rate (standard conditions, dry basis):

$$Q_{std} = \left(\frac{528}{29.92}\right)(Q_s)\left(\frac{P_s}{T_s}\right)(1 - B_{ws})$$

Q_s acfm = 16.00 $\frac{ft}{sec}$ × 7.47 ft^2 × 60 $\frac{min}{hr}$ = 7170 acfm

$$Q_{std} = \left(\frac{528}{29.92}\right) * \underline{7170} * \left(\frac{\underline{29.73}}{\underline{614.7}}\right) * (1 - \underline{0.0249}) = \underline{5968}\ dscfm$$

6. Percent Isokinetic:

$$I = 100 * \frac{A_s * V_{m(std)}}{\theta * A_n/144 * Q_{sd}}$$

$$I = 100 * \frac{7.47 * 41.924}{60 * 0.1269/144 * 5968}$$

I = 99.18 percent

7. Total Particulate (Front-half & Back-half) Calculations:

0.0 g Filter

0.0073 g Probe Rinse Section
< 0.0 >g Acetone Blank (____g x 1000 g/mg/____mL) x _____ mL sample volume

0.0059 g Organic Section
<_____>g CH_2Cl_2 Blank (____g x 1000 g/mg/____mL) x _____ mL sample volume

0.0020 g Inorganic + Acetone Rinse Section
< 0.0 >g H_2O Blank (____g x 1000 g/mg/____mL) x _____ mL sample volume
< 0.0 >g Acetone Blank (____g x 1000 g/mg/____mL) x _____ mL sample volume

0.0152 g TOTAL Particulate Matter x 1000 $\frac{g}{mg}$ = 15.2 mg

TRAVERSE POINT LOCATION FOR CIRCULAR AND RECTANGULAR DUCTS

Project No.: 41613 0010 00000

Client: Spectrum Glass

Date: 11-24-03

Sampling Location: Furnace # 2

Internal Stack Diameter: 37"

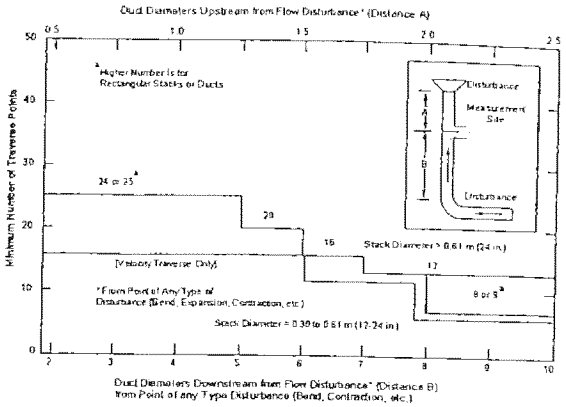
Nipple Length: ---

Total Stack Diameter: 37"

Nearest Upstream Disturbance (A):

Nearest Downstream Disturbance (B):

Calculator:



Rectangular Duct Equivalent Diameter Determination = $\frac{2 \times L \times W}{L + W}$

Traverse Point Number	1 Fraction of Stack ID (1 / 100)	2 Stack ID	3 Traverse Point (1 x 2 = Point)	4 Nipple Length	5 Traverse Point Inside of Far Wall to Outside of Port Nipple (3 + 4 = Point)
1	.021	37.0	.78		
2	.067	"	2.48		
3	.118	"	4.37		
4	.177	"	6.55		
5	.250	"	9.25		
6	.356	"	13.17		
7	.644	"	23.83		
8	.750	"	27.75		
9	.823	"	30.45		
10	.882	"	32.63		
11	.933	"	34.52		
12	.979	"	36.22		
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					

Location of Traverse Points in Circular Stacks
[Percent of stack diameter from inside wall to traverse point]

	Number of traverse points on a diameter											
	2	4	6	8	10	12	14	16	18	20	22	24
1	14.6	5..7	4.4	3.2	2.6	2.1	1.3	1.6	1.4	1.3	1.1	1.1
2	85.4	25.0	14.6	10.5	8.2	6.7	5.7	4.9	4.4	3.9	3.5	3.2
3		75.0	29.6	19.4	14.6	11.8	9.9	8.5	7.5	6.7	6.0	5.5
4		93.3	70.4	32.3	22.6	17.7	14.6	12.5	10.9	9.7	8.7	7.9
5			85.4	67.7	34.2	25.0	20.1	16.9	14.6	12.9	11.6	10.5
6			95.6	80.6	65.8	35.6	26.9	22.0	18.8	16.5	14.6	13.2
7				89.5	77.4	64.4	36.6	28.3	23.6	20.4	18.0	16.1
8				96.8	85.4	75.0	63.4	37.5	29.6	25.0	21.8	19.4
9					91.8	82.3	73.1	62.5	38.2	30.6	26.2	23.0
10					97.4	88.2	79.9	71.7	61.8	38.8	31.5	27.2
11						93.3	85.4	78.0	70.4	61.2	39.3	32.3
12						97.9	90.1	83.1	76.4	69.4	60.7	39.8
13							94.3	87.5	81.2	75.0	68.5	60.2
14							98.2	91.5	85.4	79.6	73.8	67.7
15								95.1	89.1	83.5	78.2	72.8
16								98.4	92.5	87.1	82.0	77.0
17									95.6	90.3	85.4	80.6
18									98.6	93.3	88.4	83.9
19										96.1	91.3	86.8
20										98.7	94.3	89.5
21											96.5	92.1
22											98.9	94.5
23												96.8
24												98.9

Location of Traverse Points in Rectangular Stacks

	Number of traverse points on a diameter										
	2	3	4	5	6	7	8	9	10	11	24
1	25.0	16.7	12.5	10.0	8.3	7.1	6.3	5.6	5.0	4.5	4.2
2	75.0	50.0	37.5	30.0	25.0	21.4	18.8	15.7	15.0	13.6	12.5
3		83.3	62.5	50.0	41.7	35.7	31.3	27.8	25.0	22.7	20.8
4			87.5	70.0	58.3	50.0	43.8	38.9	35.0	31.8	29.2
5				90.0	75.0	64.3	56.3	50.0	45.0	40.9	37.5
6					91.7	78.6	68.8	61.1	55.0	50.0	45.8
7						92.9	81.3	72.2	65.0	59.1	54.2
8							93.8	83.3	75.0	68.2	62.5
9								94.4	85.0	77.3	70.8
10									95.0	85.4	79.2
11										95.5	87.5
12											95.8

TRC ENVIRONMENTAL CORPORATION - ISOKINETIC FLUE GAS SAMPLING DATA SHEET

Sheet 1 of 2

Project No.:	41613-0010-00000			Train Prepared By:	Paul Clark
Client:	Spectrum Glass			Pitot Number and Side:	P1-A
Facility:	Woodinville, WA			Pitot Tube Cp:	0.85
Source:	Furnace #2			Filter No.:	4006.0
Sample Location:	Baghouse exhaust			Ambient Temp., °F:	57
Stack Diameter:	37" Ø			Bar. Pressure, In. Hg.:	29.77
Date:	11/24/2003			Assumed Moisture, %:	
Run No.:	1			Heater Box Setting, °F:	248
Operator:	Doug Towne			Nozzle # / Diam., In.:	GA-7/ 0.456
Meterbox No.:	28579			Probe Length / Material:	5 Ft Eff. Glass
Meterbox ΔH@:	1.719			Probe Heater Setting, °F:	248
Y Factor	0.992				

Impinger Weights

	Initial	Final	Weight gain
Imp # 1	705.9	709.4	
Imp # 2	692.8	704.5	
Imp # 3	715.7	718.0	2.3
Imp # 4	~~961.2~~		
Imp # 5	960.3	974.0	
Imp # 6			
Total			31.2

DLT 11/24/03

Method 5

Point	Clock Time 24-hr	Clock Time Min.	Dry Gas Meter, (ft^3)	Pitot, ΔP In. H_2O	Orifice ΔH, In. H_2O Desired	Orifice ΔH, In. H_2O Actual	Pump Vacuum, In. Hg	Temperatures °F Stack	Probe	Filter Box	Imp Temp	XAD Cond	Meter Inlet	Meter Outlet	Filter Outlet	Heated Jumper
A	1601	0	78.459	0.09	3.24	3.2	7.5	161	255	251	47	NA	57	56	NA	NA
2		2.5	80.86	0.08	2.97	2.9	7	164	255	249	43		56	56		
3		5	83.25	0.09	3.21	3.2	7	166	247	250	40		57	56		
4		7.5	85.76	0.1	3.57	3.6	8	166	256	252	39		57	56		
5		10	88.30	0.13	4.62	4.60	8.5	170	247	251	41		58	57		
6		12.5	91.05	0.12	4.27	3.9	8	172	255	251	43		58	56		
7		15	93.75	0.1	3.5	3.5	8	173	253	253	44		59	56		
8		17.5	96.51	0.1	3.5	3.5	8	173	247	251	44		59	56		
9		20	99.08	0.11	3.58	3.8	8	174	247	255	44		60	57		
10		22.5	101.76	0.05	1.77	1.8	5	172	247	252	45		60	57		
11		25	103.75	0.05	1.76	1.8	5	171	252	251	45		60	57		
12		27.5	105.72	0.05	1.78	1.8	5	170	246	249	44		61	58		
		30	107.64													

Train Leak Check:

Before Test: 0.002 Ft^3 in 60 Seconds at 15 In. Hg.

After Test: 0.000 Ft^3 in 60 Seconds at 9 In. Hg.

Comments:

	Initial	Final	Port	Static Pressure			
			A				
Pitot Tube Leak Check	✓	✓	Inches H_2O	-0.5			
ORSAT Train Leak Check	✓	✓	Inches Hg				

Silica Gel Condition: Port A [illegible] Port B [illegible]

Port C _____ Port D _____

TRC Environmental Corp.

TRC ENVIRONMENTAL CORPORATION - ISOKINETIC FLUE GAS SAMPLING DATA SHEET

Project No.: 41613-0010-00000
Client: Spectrum Glass
Facility: Woodinville, WA
Source: Furnace #2

Date: 4.24.03
Run No.: 1
Sample Location: Furnace #2
Operator: DC Tolliver

Sheet 2 of 2

Point	Clock Time 24-hr	Clock Time Min.	Dry Gas Meter, (ft^3)	Pitot, ΔP In. H_2O	Orifice ΔH, In. H_2O Desired	Orifice ΔH, In. H_2O Actual	Pump Vacuum, In. Hg	Temperatures °F Stack	Probe	Filter Box	Imp Temp	XAD Cond	Meter Inlet	Meter Outlet	Filter Outlet	Heated Jumper
B 1	1656	30	107.648	0.08	2.83	2.8	6	165	252	251	44	NA	60	59	NA	NA
2		32.5	109.75	0.08	2.81	2.8	6	169	249	250	45	↓	60	60	↓	↓
3		35	112.083	0.08	2.84	2.8	6	169	255	249	42		61	60		
4		37.5	114.41	0.07	2.46	2.5	5.5	169	249	249	41		61	60		
5		40	116.66	0.08	2.81	2.8	6	169	255	250	41		61	59		
6		42.5	118.97	0.08	2.82	2.8	6	167	246	251	42		61	59		
7		45	121.30	0.06	2.11	2.1	5	166	233	251	43		62	59		
8		47.5	123.46	0.07	2.48	2.5	5.5	165	244	249	43		62	59		
9		50	125.63	0.07	2.41	2.5	5.5	164	249	249	43		63	59		
10		52.5	127.82	0.06	2.14	2.2	5	165	233	249	42		63	59		
11		55	129.94	0.07	2.51	2.5	5.5	161	246	252	44		63	60		
12		57.5	132.09	0.07	2.51	2.5	5.5	162	252	251	44		63	60		
	1728	60	134.400									↓			↓	↓
		Total	55.941	ft³	AVG	2.825		167.5						58.9		

Train Leak Check During Test:

					Meter Reading Stop	Meter Reading Restart
Before Test:	____ ft^3 in	____	Seconds at	____	In. Hg. ____ ft^3	____ ft^3
After Test:	____ ft^3 in	____	Seconds at	____	In. Hg. ____ ft^3	____ ft^3

Comments:

TRC ENVIRONMENTAL CORPORATION - ISOKINETIC FLUE GAS SAMPLING DATA SHEET

Project No.:	41613-0010-00000						Sheet 1 of 2		
Client:	Spectrum Glass						Train Prepared By:	Paul Clark	
Facility:	Woodinville, WA		Impinger Weights				Pitot Number and Side:	P1-A	
Source:	Furnace #2		Initial	Final	Weight gain		Pitot Tube Cp:	0.85	
Sample Location:	Baghouse exhaust	Imp # 1	706.2	714.9	8.7		Filter No.:	[illegible]	
Stack Diameter:	37" ø	Imp # 2	695.6	702.9	7.3		Ambient Temp., °F:	58	
Date:	11/24/2003	Imp # 3	736.9	738.1	1.2		Bar. Pressure, In. Hg.:	29.77	
Run No.:	2	Imp # 4	254.8	263.3	8.5		Assumed Moisture, %:	4	
Operator:	Doug Towne	Imp # 5					Heater Box Setting, °F:	248	
Meterbox No.:	28579	Imp # 6					Nozzle # / Diam., In.:	~~GA-7/ 0.456~~ GB6 .462	
Meterbox ΔH@:	1.719	Total			22.7		Probe Length / Material:	5 Ft Eff. Glass	
Y Factor	0.992						Probe Heater Setting, °F:	248	

Method 5

Point	Clock Time 24-hr	Clock Time Min.	Dry Gas Meter, (ft^3)	Pitot, ΔP In. H_2O	Orifice ΔH, In. H_2O Desired	Orifice ΔH, In. H_2O Actual	Pump Vacuum, In. Hg	Temperatures °F Stack	Probe	Filter Box	Imp Temp	XAD Cond	Meter Inlet	Meter Outlet	Filter Outlet	Heated Jumper
1	1725	0	134.610	.07	1.49	1.50	4	166	249	254	42	N/A	58	58	N/A	✓
2		2.5	136.250	.07	1.45	1.50	4	164	248	251	41	✓	58	58		✓
3		5	137.950	.07	1.49	1.50	4	160	248	249	41	✓	58	58		✓
4		7.5	139.710	.07	1.51	1.50	4	154	251	249	42	✓	60	58		✓
5		10	141.465	.07	1.52	1.50	4	153	251	254	43	✓	61	58		✓
6		12.5	143.280	.07	1.52	1.50	4	153	250	252	43	✓	63	58		✓
7		15	145.025	.07	1.52	1.50	4	152	253	253	43	✓	64	58		✓
8		17.5	146.800	.07	1.52	1.50	4	152	248	252	43	✓	65	59		✓
9		20	148.570	.07	1.52	1.50	4	152	248	252	43	✓	66	60		✓
10		22.5	150.350	.06	1.30	1.30	3.5	151	250	252	43	✓	67	60		✓
11		25	152.005	.06	1.30	1.30	3.5	151	246	250	43	✓	67	61		✓
12		27.5	153.645	.07	1.52	1.50	4	151	253	250	43	✓	68	61	✓	✓
End	1755	30	155.337													

Train Leak Check:

Before Test: 0.001 Ft^3 in 60 Seconds at 15 In. Hg.

After Test: [illegible] Ft^3 in 60 Seconds at 6 In. Hg.

Comments:

	Initial	Final	Static Pressure Port				
Pitot Tube Leak Check	✓	✓	Port	A			
ORSAT Train Leak Check	✓	✓	Inches H_2O	-0.5			
			Inches Hg				

Silica Gel Condition: Port A _____ Port B _____ Port C _____ Port D _____

TRC ENVIRONMENTAL CORPORATION - ISOKINETIC FLUE GAS SAMPLING DATA SHEET

Project No.: 41613-0010-00000 Date: 11.24.03 Sheet 2 of 2

Client: Spectrum Glass Run No.: 2

Facility: Woodinville, WA Sample Location: Furnace #2

Source: Furnace #2 Operator: DC Tomlinson

Point	Clock Time 24-hr	Clock Time Min.	Dry Gas Meter, (ft^3)	Pitot, ΔP In. H_2O	Orifice ΔH, In. H_2O Desired	Orifice ΔH, In. H_2O Actual	Pump Vacuum, In. Hg	Temperatures °F Stack	Probe	Filter Box	Imp Temp	XAD Cond	Meter Inlet	Meter Outlet	Filter Outlet	Heated Jumper
B1	1800	30	155.337	0.04	0.84	.84	3	147	252	252	251	NA	65	62	NA	NA
2		32.5	156.642	0.06	1.29	1.3	4	153	248	249	41		65	63		
3		35	158.285	0.07	1.519	1.52	4	154	247	252	40		66	63		
4		37.5	159.945	0.07	1.512	1.51	4	155	255	252	40		68	63		
5		40	161.650	0.08	1.72	1.72	4.5	157	248	252	41		69	63		
6		42.5	163.470	0.07	1.51	1.51	4.5	159	248	249	41		69	65		
7		45	165.270	0.07	1.51	1.51	4	156	251	251	41		70	64		
8		47.5	167.050	0.07	1.51	1.51	11	156	249	249	41		70	64		
9		50	168.850	0.09	1.95	2.0	5	155	246	249	41		71	65		
10		52.5	170.790	0.08	1.74	1.74	4.5	154	251	252	42		71	65		
11		55	172.700	0.08	1.75	1.8	4.5	154	249	249	43		71	65		
12		57.5	175.585	0.09	1.97	2.0	5	154	245	250	43		71	65		
	1830	60	176.574													
		TOTAL	41.964	ft^3	Avg	1.523		154.7						63.6		

Train Leak Check During Test: Comments:

						Meter Reading Stop	Meter Reading Restart
Before Test:	____ Ft^3	in ____	Seconds at ____	In. Hg.		____ ft^3	____ ft^3
After Test:	____ Ft^3	in ____	Seconds at ____	In. Hg.		____ ft^3	____ ft^3

TRC ENVIRONMENTAL CORPORATION - ISOKINETIC FLUE GAS SAMPLING DATA SHEET

Sheet 1 of 2

Project No.:	41613-0010-00000
Client:	Spectrum Glass
Facility:	Woodinville, WA
Source:	Furnace #2
Sample Location:	Baghouse exhaust
Stack Diameter:	37" Ø
Date:	11/24/2003
Run No.:	3
Operator:	Doug Towne
Meterbox No.:	28579
Meterbox ΔH@:	1.719
Y Factor	0.992

Impinger Weights

	Initial	Final	Weight gain
Imp # 1	708.7	714.2	5.5
Imp # 2	[illegible].2	168.6	7.4
Imp # 3	711.6	712.9	1.3
Imp # 4	238.0	241.5	2.5
Imp # 5			
Imp # 6			
Total			22.7

Train Prepared By:	Paul Clark
Pitot Number and Side:	P1-A
Pitot Tube Cp:	0.85
Filter No.:	11006 5
Ambient Temp., °F:	65
Bar. Pressure, In. Hg.:	29.27
Assumed Moisture, %:	4
Heater Box Setting, °F:	248
Nozzle # / Diam., In.:	CB 6 ~~GA-7/0.456~~ C1402
Probe Length / Material:	5 Ft Eff. Glass
Probe Heater Setting, °F:	248

Method 5

Point	Clock Time 24-hr	Clock Time Min.	Dry Gas Meter, (ft^3)	Pitot, ΔP In. H_2O	Orifice ΔH, In. H_2O Desired	Orifice ΔH, In. H_2O Actual	Pump Vacuum, In. Hg	Temperatures °F Stack	Probe	Filter Box	Imp Temp	XAD Cond	Meter Inlet	Meter Outlet	Filter Outlet	Heated Jumper
1	1852	0	176.649	0.05	1.09	1.1	3.5	151	246	248	46	NA	65	65	NA	NA
2		2.5	178.174	0.04	0.87	0.87	3	150	251	249	43		65	65		
3		5	179.580	0.04	0.88	0.88	3	147	248	253	41		65	65		
4		7.5	180.900	0.04	0.88	0.88	3	147	248	251	41		66	65		
5		10	182.260	0.07	1.53	1.55	4	148	245	254	41		65	65		
6		12.5	183.931	0.07	1.53	1.55	4	147	251	248	41		66	65		
7		15	185.705	0.06	1.31	1.30	4	147	249	248	41		70	65		
8		17.5	187.410	0.08	1.75	1.75	4.5	147	247	247	42		71	65		
9		20	189.235	0.09	1.97	1.95	5	146	251	248	42		71	65		
10		22.5	191.240	0.09	1.98	2.0	5	146	250	246	42		72	65		
11		25	193.330	0.09	1.98	2.0	5	146	251	257	43		72	66		
12		27.5	195.185	0.09	1.99	2.0	5	146	251	250	43		72	66		
5.0	1922	30	197.162	[illegible]	Change											
1	1930	30	197.162	0.07	1.54	1.55	4.5	144	253	248	43		70	66		

Train Leak Check:

Before Test: 0.002 Ft^3 in 60 Seconds at 15 In. Hg.

After Test: 0.000 Ft^3 in 60 Seconds at 6 In. Hg.

Comments:

	Initial	Final	Static Pressure
Pitot Tube Leak Check	✓	✓	Port: 1
ORSAT Train Leak Check	✓	✓	Inches H_2O: -0.5
			Inches Hg:

Silica Gel Condition: Port A Blue Port B Blue Port C Port D

IsoDataSheet with moisture, Page 1

TRC Environmental Corp.

TRC ENVIRONMENTAL CORPORATION - ISOKINETIC FLUE GAS SAMPLING DATA SHEET

Project No.: 41613-0010-00000 Date: 11 2 4 0 3 Sheet 2 of 2

Client: Spectrum Glass Run No.: 3

Facility: Woodinville, WA Sample Location: Furnace #2

Source: Furnace #2 Operator: T Stone

Point	Clock Time 24-hr	Clock Time Min.	Dry Gas Meter, (ft^3)	Pitot, ΔP In. H_2O	Orifice ΔH, In. H_2O Desired	Orifice ΔH, In. H_2O Actual	Pump Vacuum, In. Hg	Temperatures °F Stack	Probe	Filter Box	Imp Temp	XAD Cond	Meter Inlet	Meter Outlet	Filter Outlet	Heated Jumper
A 2		32.5	199.000	0.07	1.54	1.55	4	144	251	251	43	NA	70	66	NA	NA
3		35	200.840	0.07	1.54	1.55	4	144	249	250	43		71	66		
4		37.5	202.580	0.07	1.54	1.55	4	144	250	252	43		71	66		
5		40	204.350	0.07	1.54	1.55	4	146	249	249	44		72	66		
6		42.5	206.050	0.07	1.54	1.55	4	146	248	251	44		73	66		
7		45	208.010	0.07	1.54	1.55	4	146	250	253	44		73	66		
8		47.5	209.7[illegible]	0.07	1.54	1.55	4	145	249	249	43		74	67		
9		50	211.555	0.06	1.32	1.30	3.5	145	248	251	43		74	67		
10		52.5	213.210	0.06	1.32	1.30	3.5	144	248	252	43		74	67		
11		55	214.875	0.07	1.54	1.55	4	144	247	249	43		74	67		
12		57.5	216.540	0.06	1.32	1.30	4	144	250	250	43		74	68		
End	2000	60	218.362													
		TOTAL	41.713	ft^3	AVG	1.487		146.0						68.3		

Train Leak Check During Test: Comments:

						Meter Reading Stop	Meter Reading Restart
Before Test:	Ft^3 in		Seconds at		In. Hg.	ft^3	ft^3
After Test:	Ft^3 in		Seconds at		In. Hg.	ft^3	ft^3

24100 Snohomish - Woodinville Rd

CITY	STATE	ZIP
Woodinville	WA	98072

PHONE (KEY CONTACT):

SOURCE ID NUMBER: Furnace #4

PROCESS EQUIPMENT: Batch Glass Furnace — OPERATING MODE: Normal

CONTROL EQUIPMENT: ~~BS~~ DCT Baghouse — OPERATING MODE: Normal

DESCRIBE EMISSION POINT: Stack Exhaust

HEIGHT ABOVE GROUND LEVEL	HEIGHT RELATIVE TO OBSERVER
50'	Start 20' End 20'
DISTANCE FROM OBSERVER	**DIRECTION FROM OBSERVER**
Start 75' End 75'	Start North End North

DESCRIBE EMISSIONS: Start Clear End Clear

EMISSION COLOR	IF WATER DROPLET PLUME
Start None End None	Attached ☐ NA Detached ☐

POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED: Start No plume End No plume

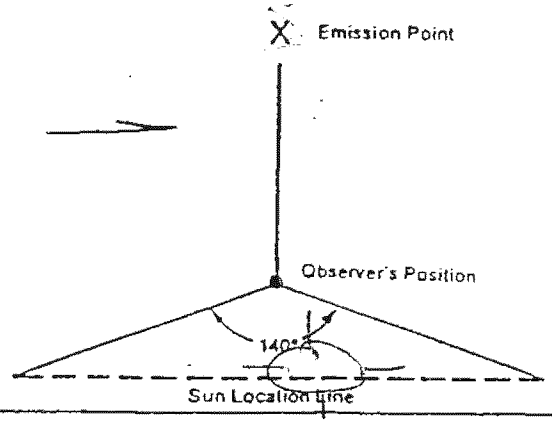
DESCRIBE PLUME BACKGROUND: Start Partly Cloudy (Sky) End Partly Cloudy

BACKGROUND COLOR	SKY CONDITIONS
Start White/Blue End White/Blue	Start Partly Cloudy End Partly Cloudy
WIND SPEED	**WIND DIRECTION**
Start 5-10 mph End 5-10 mph	Start End

AMBIENT TEMP	WET BULB TEMP	RH, percent
Start NA End NA	NA	NA

Stack with Plume
Sun
Wind

SOURCE LAYOUT SKETCH — Draw North Arrow: (1)



ADDITIONAL INFORMATION:

MIN	0	15	30	45	COMMENTS
1	0	0	0	0	Run #1 - Start: 0900
2	0	0	0	0	
3	0	0	0	0	
4	0	0	0	0	
5	0	0	0	0	
6	0	0	0	0	End: 0906
7					
8					
9	0	0	0	0	Run #2 - Start: 1030
10	0	0	0	0	
11	0	0	0	0	
12	0	0	0	0	
13	0	0	0	0	
14	0	0	0	0	End: 1036
15					
16	~~0~~	~~0~~	~~0~~	~~0~~	DCT Run #3 2
17	0	0	0	0	Start: 1202
18	0	0	0	0	
19	0	0	0	0	
20	0	0	0	0	
21	0	0	0	0	
22	0	0	0	0	End: 1208
23					
24					
25					
26					
27					
28					
29					
30					

OBSERVER'S NAME (PRINT): Douglas C Towne

OBSERVER'S SIGNATURE: Towne — DATE: 11-24-03

ORGANIZATION: TRC Environmental

CERTIFIED BY: Yakima Clean Air Auth. — DATE:

CONTINUED ON VEO FORM NUMBER:

TRAVERSE POINT LOCATION FOR CIRCULAR AND RECTANGULAR DUCTS

Project No.: 41613-C010-00000

Client: Spectrum Glass

Date: 11-24-03

Sampling Location: Furnace #4

Internal Stack Diameter: 40"

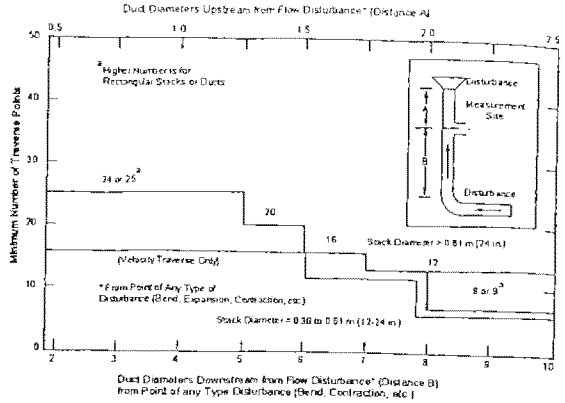
Nipple Length: 2.75"

Total Stack Diameter: 42.75"

Nearest Upstream Disturbance (A): _____

Nearest Downstream Disturbance (B): _____

Calculator: _____



Rectangular Duct Equivalent Diameter Determination = $\frac{2 \times L \times W}{L + W}$

Traverse Point Number	1 Fraction of Stack ID (1/100)	2 Stack ID	3 Traverse Point (1 x 2 = Point)	4 Nipple Length	5 Traverse Point Inside of Far Wall to Outside of Port Nipple (3 + 4 = Point)
1	.021	40.0	.84	2.75	3.59
2	.067	"	2.56	"	5.31
3	.118	"	4.72	"	7.47
4	.177	"	7.08	"	9.83
5	.250	"	10.0	"	12.75
6	.356	"	14.24	"	16.99
7	.644	"	25.76	"	28.51
8	.750	"	30.0	"	32.75
9	.823	"	32.92	"	35.67
10	.882	"	35.28	"	38.03
11	.933	"	37.32	"	40.07
12	.979	"	39.16	"	41.91
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					

Location of Traverse Points in Circular Stacks
[Percent of stack diameter from inside wall to traverse point]

	Number of traverse points on a diameter											
	2	4	6	8	10	12	14	16	18	20	22	24
1	14.6	5.7	4.4	3.2	2.6	2.1	1.3	1.6	1.4	1.3	1.1	1.1
2	85.4	25.0	14.6	10.5	8.2	6.7	5.7	4.9	4.4	3.9	3.5	3.2
3		75.0	29.6	19.4	14.6	11.8	9.9	8.5	7.5	6.7	6.0	5.5
4		93.3	70.4	32.3	22.6	17.7	14.6	12.5	10.9	9.7	8.7	7.9
5			85.4	67.7	34.2	25.0	20.1	16.9	14.6	12.9	11.6	10.5
6			95.6	80.6	65.8	35.6	26.9	22.0	18.8	16.5	14.6	13.2
7				89.5	77.4	64.4	36.6	28.3	23.6	20.4	18.0	16.1
8				96.8	85.4	75.0	63.4	37.5	29.6	25.0	21.8	19.4
9					91.8	82.3	73.1	62.5	38.2	30.6	26.2	23.0
10					97.4	88.2	79.9	71.7	61.8	38.8	31.5	27.2
11						93.3	85.4	78.0	70.4	61.2	39.3	32.3
12						97.9	90.1	83.1	76.4	69.4	60.7	39.8
13							94.3	87.5	81.2	75.0	68.5	60.2
14							98.2	91.5	85.4	79.6	73.8	67.7
15								95.1	89.1	83.5	78.2	72.8
16								98.4	92.5	87.1	82.0	77.0
17									95.6	90.3	85.4	80.6
18									98.6	93.3	88.4	83.9
19										96.1	91.3	86.8
20										98.7	94.3	89.5
21											96.5	92.1
22											98.9	94.5
23												96.8
24												98.9

Location of Traverse Points in Rectangular Stacks

	Number of traverse points on a diameter										
	2	3	4	5	6	7	8	9	10	11	24
1	25.0	16.7	12.5	10.0	8.3	7.1	6.3	5.6	5.0	4.5	4.2
2	75.0	50.0	37.5	30.0	25.0	21.4	18.8	15.7	15.0	13.6	12.5
3		83.3	62.5	50.0	41.7	35.7	31.3	27.8	25.0	22.7	20.8
4			87.5	70.0	58.3	50.0	43.8	38.9	35.0	31.8	29.2
5				90.0	75.0	64.3	56.3	50.0	45.0	40.9	37.5
6					91.7	78.6	68.8	61.1	55.0	50.0	45.8
7						92.9	81.3	72.2	65.0	59.1	54.2
8							93.8	83.3	75.0	68.2	62.5
9								94.4	85.0	77.3	70.8
10									95.0	85.4	79.2
11										95.5	87.5
12											95.8

TRC ENVIRONMENTAL CORPORATION - ISOKINETIC FLUE GAS SAMPLING DATA SHEET

Sheet 1 of 2

Project No.:	41613-0010-00000			Train Prepared By:	Paul Clark
Client:	Spectrum Glass			Pitot Number and Side:	P1-A
Facility:	Woodinville, WA			Pitot Tube Cp:	0.85
Source:	Furnace #4			Filter No.:	11 0056
Sample Location:	Baghouse exhaust			Ambient Temp., °F:	42
Stack Diameter:	40" Φ			Bar. Pressure, In. Hg.:	29.77
Date:	11/24/2003			Assumed Moisture, %:	5
Run No.:	1			Heater Box Setting, °F:	248
Operator:	~~Matt Ellis~~ PJ Clark			Nozzle # / Diam., In.:	GA-7/ 0.456
Meterbox No.:	28579			Probe Length / Material:	5 Ft Eff. Glass
Meterbox ΔH@:	1.719			Probe Heater Setting, °F:	248
Y Factor	0.992				

Impinger Weights

	Initial	Final	Weight gain
Imp # 1	705.6	724.8	
Imp # 2	697.7	709.1	
Imp # 3	711.5	714.0	
Imp # 4	541.8	902.1	
Imp # 5			
Imp # 6			
Total			43.4

Method 5

Point	Clock Time 24-hr	Clock Time Min.	Dry Gas Meter, (ft^3)	Pitot, ΔP In. H_2O	Orifice ΔH, In. H_2O Desired	Orifice ΔH, In. H_2O Actual	Pump Vacuum, In. Hg	Temperatures °F Stack	Probe	Filter Box	Imp Temp	XAD Cond	Meter Inlet	Meter Outlet	Filter Outlet	Heated Jumper
A-1	0930	0	931.645	0.04	1.29	1.30	5	220	251	254	52	~64	52	52	n/a	~1
2		2.5	933.457	0.04	1.29	1.30	5	224	249	252	43		51	51		
3		5	935.075	0.04	1.28	1.30	5	226	248	251	40		52	52		
4		7.5	936.650	0.04	1.25	1.30	5	227	248	252	41		53	53		
5		10	938.200	0.04	1.28	1.30	5	227	248	252	43		57	54		
6		12.5	940.045	0.04	1.28	1.30	5	227	249	251	44		55	55		
7		15	941.640	0.04	1.28	1.30	5	227	251	251	44		57	54		
8		17.5	943.235	0.04	1.28	1.30	5	227	256	252	45		58	54		
9		20	944.860	0.04	1.28	1.30	5	227	254	251	44		57	54		
10		22.5	946.500	0.04	1.28	1.30	5	227	253	249	44		57	54		
11		25	948.080	0.04	1.28	1.30	5	225	250	254	44		57	54		
12		27.5	949.610	0.04	1.28	1.30	5	225	249	252	45		57	54		
3D-1	0920	30	951.356	2.00	check											
B-1	0923	30	951.396	0.03	0.96	0.96	4	223	249	252	46		57	55		

Train Leak Check:

Before Test: 0.000 Ft^3 in 60 Seconds at 15 In. Hg.

After Test: 0.000 Ft^3 in 60 Seconds at 2 In. Hg.

Comments: Vol 344mL's

	Initial	Final	Port	Static Pressure			
			A				
Pitot Tube Leak Check	✓	✓	Inches H_2O	-0.09			
ORSAT Train Leak Check	✓	✓	Inches Hg				

Silica Gel Condition: Port A Blue Port B Blue Port C Port D

TRC Environmental Corp.

TRC ENVIRONMENTAL CORPORATION - ISOKINETIC FLUE GAS SAMPLING DATA SHEET

Project No.: 41613-0010-00000 Date: 11-24-03 Sheet 2 of 2

Client: Spectrum Glass Run No.: 12-1

Facility: Woodinville, WA Sample Location: B, Lunch chute

Source: Furnace #4 Operator: RJ Clum

Point	Clock Time 24-hr	Clock Time Min.	Dry Gas Meter, (ft^3)	Pitot, ΔP In. H_2O	Orifice ΔH, In. H_2O Desired	Orifice ΔH, In. H_2O Actual	Pump Vacuum, In. Hg	Temperatures °F Stack	Probe	Filter Box	Imp Temp	XAD Cond	Meter Inlet	Meter Outlet	Filter Outlet	Heated Jumper
B-2		32.5	952.750	.03	0.96	0.96	4	224	246	253	41	N/A	58	56	N/A	N/A
3		35	954.130	.04	1.29	1.30	4.5	226	249	246	43		59	56		
4		37.5	955.795	.04	1.29	1.30	4.5	226	253	248	43		60	56		
5		40	957.315	.04	1.29	1.30	4.5	226	250	247	43		60	57		
6		42.5	959.000	.04	1.29	1.30	4.5	227	249	246	43		60	58		
7		45	960.420	.04	1.29	1.30	4.5	227	244	246	44		60	57		
8		47.5	962.190	.04	1.29	1.30	4.5	227	245	246	44		60	57		
9		50	964.030	.04	1.29	1.30	4.5	226	246	251	44		61	58		
10		52.5	965.780	.04	1.29	1.30	4.5	226	243	249	44		61	58		
11		55	967.250	.04	1.29	1.30	4.5	223	253	244	44		61	58		
12		57.5	968.780	.03	0.98	0.98	4	221	251	250	45	✓	61	58	✓	✓
5	0953	60	970.193													
		TOTAL	38.248	ft3	Avg	1.258		225.5						56.5		

Train Leak Check During Test:

Meter Reading — Stop / Restart

Comments:

Before Test: _____ Ft^3 in _____ Seconds at _____ In. Hg. _____ ft^3 _____ ft^3

After Test: _____ Ft^3 in _____ Seconds at _____ In. Hg. _____ ft^3 _____ ft^3

TRC ENVIRONMENTAL CORPORATION - ISOKINETIC FLUE GAS SAMPLING DATA SHEET

Sheet 1 of 2

Project No.:	41613-0010-00000	Train Prepared By:	Paul Clark
Client:	Spectrum Glass	Pitot Number and Side:	P1-A
Facility:	Woodinville, WA	Pitot Tube Cp:	0.85
Source:	Furnace #4	Filter No.:	100878
Sample Location:	Baghouse exhaust	Ambient Temp., °F:	
Stack Diameter:	40" ϕ	Bar. Pressure, In. Hg.:	29.71
Date:	11/24/2003	Assumed Moisture, %:	4
Run No.:	2	Heater Box Setting, °F:	248
Operator:	Matt Ellis	Nozzle # / Diam., In.:	GA-7/ 0.456
Meterbox No.:	28579	Probe Length / Material:	5 Ft Eff. Glass
Meterbox ΔH@:	1.719	Probe Heater Setting, °F:	248
Y Factor	0.992		

Impinger Weights

	Initial	Final	Weight gain
Imp # 1	704.2	725.5	
Imp # 2	691.5	701.5	
Imp # 3	714.7	716.9	
Imp # 4	928.1	938.4	
Imp # 5			
Imp # 6			
Total			43.8

Method 5

Point	Clock Time 24-hr	Clock Time Min.	Dry Gas Meter, (ft^3)	Pitot, ΔP In. H_2O	Orifice ΔH, In. H_2O Desired	Orifice ΔH, In. H_2O Actual	Pump Vacuum, In. Hg	Temperatures °F Stack	Probe	Filter Box	Imp Temp	XAD Cond	Meter Inlet	Meter Outlet	Filter Outlet	Heated Jumper
A/2	1010	00	970.528	0.04	1.28	1.3	4	219	245	245	48	N/A	57	57		N/A
11		02	972.300	0.04	1.28	1.3	4	219	245	250	46		57	57		
10		5	974.050	0.04	0.933	0.93	4	224	251	251	48		58	57		
9		7.5	975.350	0.03	0.96	0.96	4	226	244	250	48		59	57		
8		10	976.450	0.04	1.28	1.3	4	227	248	250	48		59	57		
7		12.5	977.850	0.03	0.96	0.96	4	227	250	250	48		60	57		
6		15	979.395	0.04	1.28	1.3	4	227	250	251	47		60	57		
5		17.5	980.995	0.04	1.29	1.3	4	229	250	251	47		61	57		
4		20	982.400	0.04	1.28	1.3	4	220	250	249	45		61	58		
3		22.5	985.300	0.04	1.3	1.3	4	217	250	249	45		62	58		
2		25	986.095	0.04	1.3	1.3	4	216	250	250	45		63	58		
1		27.5	987.500	0.04	1.3	1.3	4	216	250	251	45		63	60		
STOP	1040	30	989.129	0.0		Pb +	Change									
B/2	1	~~35~~ 00	989.129	0.03	0.98	0.98	4	220	250	251	45		61	60		

Train Leak Check:

Before Test: 0.001 Ft^3 in 60 Seconds at 15 In. Hg.

After Test: 0.001 Ft^3 in 60 Seconds at 5 In. Hg.

Comments: 1/2 354 mb

1/2 350 mb total

	Initial	Final	Port	Static Pressure			
			A				
Pitot Tube Leak Check	✓	✓	Inches H_2O	-0.09			
ORSAT Train Leak Check	✓	✓	Inches Hg				

Silica Gel Condition: Port A Blue Port B Blue

Port C Port D

TRC Environmental Corp.

TRC ENVIRONMENTAL CORPORATION - ISOKINETIC FLUE GAS SAMPLING DATA SHEET

Project No.:	02398-0040-00003	Date:	24-Nov-03	Sheet	2 of 2
Client:	Spectrum Glass	Run No.:	2		
Facility:	Woodinville, WA	Sample Location:	Furnace #2 baghouse exhaust		
Source:	Furnace ~~#2~~ 4	Operator:	~~Doug Towne~~ pl. E 115		

TRAIN METHOD: Method 5

Point	Clock Time 24-hr	Clock Time Min.	Dry Gas Meter, (ft^3)	Pitot, ΔP In. H_2O	Orifice ΔH, In. H_2O Desired	Orifice ΔH, In. H_2O Actual	Pump Vacuum, In. Hg	Temperatures °F Stack	Probe	Filter Box	Imp Temp	XAD Cond	Meter Inlet	Meter Outlet	Filter Outlet	Heated Jumper
11	1050	25	990.450	0.03	0.97	0.97	4	223	250	252	42	NA	62	60		NA
10		5	991.995	0.03	0.97	0.97	4	223	251	252	42		62	60		
9		7.5	993.450	0.03	0.97	0.97	4	223	250	251	44		62	60		
8		10	994.700	0.04	1.29	1.3	4	225	250	251	44		63	61		
7		12.5	996.350	0.04	1.29	1.3	4	227	250	251	44		64	61		
6		15	998.150	0.04	1.29	1.3	4	225	250	253	44		65	61		
5		17.5	999.550	0.04	1.29	1.3	4	225	248	253	43		64	61		
4		20	000.995	0.03	0.98	0.98	4	217	248	253	43		64	61		
3		22.5	002.850	0.03	0.98	0.98	4	217	250	252	43		63	61		
2		25	004.300	0.04	1.31	1.3	4	211	250	252	44		62	61		
1		27.5	005.605	0.04	1.31	1.3	4	211	250	252	44		61	61		
END	1112	30	007.263													
		TOTAL	36.935	ft^3	Avg	1.175		221.3						60.3		

Train Leak Check During Test:

					Meter Reading Stop	Meter Reading Restart
Before Test:	/ ft^3 in	/	Seconds at	/ In. Hg.	/ ft^3	/ ft^3
After Test:	/ ft^3 in	/	Seconds at	/ In. Hg.	/ ft^3	/ ft^3

Comments:

TRC Environmental Corp.

TRC ENVIRONMENTAL CORPORATION - ISOKINETIC FLUE GAS SAMPLING DATA SHEET

Sheet 1 of 2

Project No.:	41613-0010-00000		Impinger Weights			Train Prepared By:	Paul Clark
Client:	Spectrum Glass		Initial	Final	Weight gain	Pitot Number and Side:	P1-A
Facility:	Woodinville, WA	Imp # 1	702.2	701.0		Pitot Tube Cp:	0.85
Source:	Furnace #4	Imp # 2	693.5	701.7		Filter No.:	110058
Sample Location:	Baghouse exhaust	Imp # 3	707.7	720.8		Ambient Temp., °F:	
Stack Diameter:		Imp # 4	840.9	854.8		Bar. Pressure, In. Hg.:	29.77
Date:	11/24/2003	Imp # 5				Assumed Moisture, %:	4
Run No.:	3	Imp # 6				Heater Box Setting, °F:	248
Operator:	Matt Ellis	Total			42.0	Nozzle # / Diam., In.:	GA-7/ 0.456
Meterbox No.:	28579					Probe Length / Material:	5 Ft Eff. Glass
Meterbox ΔH@:	1.719					Probe Heater Setting, °F:	248
Y Factor	0.992						

Method 5

Point	Clock Time 24-hr	Clock Time Min.	Dry Gas Meter, (ft^3)	Pitot, ΔP In. H_2O	Orifice ΔH, In. H_2O Desired	Orifice ΔH, In. H_2O Actual	Pump Vacuum, In. Hg	Temperatures °F: Stack	Probe	Filter Box	Imp Temp	XAD Cond	Meter Inlet	Meter Outlet	Filter Outlet	Heated Jumper
A 12	1129	00	007.313	0.04	1.3	1.3	4	220	250	245	47	NA	58	58	NA	
11		2.5	009.450	0.04	1.3	1.3	4	224	250	245	47		59	60		
10		5	010.550	0.04	1.29	1.3	4	226	250	245	46		60	60		
9		7.5	012.575	0.04	1.29	1.3	4	226	250	245	44		61	60		
8		10	014.550	0.04	1.29	1.3	4	226	250	247	44		62	60		
7		12.5	015.775	0.04	1.29	1.3	4	226	252	247	43		62	60		
6		15	017.300	0.04	1.29	1.3	4	226	252	247	43		62	60		
5		17.5	018.040	0.03	0.97	0.97	4	226	250	248	43		63	60		
4		20	020.250	0.04	1.29	1.3	4	227	250	245	43		64	61		
3		22.5	022.000	0.04	1.29	1.3	4	226	250	250	42		62	60		
2		25	023.300	0.03	0.97	0.97	4	226	250	250	42		62	60		
1		27.5	024.550	0.03	0.97	0.97	4	226	250	250	42		62	60		
Stop	1159	30	025.910				Stop for Port change									
B 12	1202	00	025.910	0.03	0.97	0.97	4	225	250	250	42		60	60		

Train Leak Check:

Before Test: 0.000 Ft^3 in 60 Seconds at 15 In. Hg.

After Test: 0.000 Ft^3 in 60 Seconds at 7 In. Hg.

Comments:

	Initial	Final	Port	Static Pressure
Pitot Tube Leak Check	✓	✓	Inches H_2O	56 / -3.08 / / /
ORSAT Train Leak Check	✓	✓	Inches Hg	/ / / /

Silica Gel Condition: Port A Blue Port B Blue Port C / Port D /

IsoDataSheet with moisture, Page 1

TRC Environmental Corp.

ED_000719_00023864-00056

TRC ENVIRONMENTAL CORPORATION - ISOKINETIC FLUE GAS SAMPLING DATA SHEET

Project No.: 41613-0010-00000 | Date: 11/24/03 | Sheet 2 of 2

Client: Spectrum Glass | Run No.: 3

Facility: Woodinville, WA | Sample Location: Baghouse exhaust

Source: Furnace #4 | Operator: M.T. Ellis

Point	Clock Time 24-hr	Clock Time Min.	Dry Gas Meter, (ft^3)	Pitot, ΔP In. H_2O	Orifice ΔH, In. H_2O Desired	Orifice ΔH, In. H_2O Actual	Pump Vacuum, In. Hg	Temperatures °F Stack	Probe	Filter Box	Imp Temp	XAD Cond	Meter Inlet	Meter Outlet	Filter Outlet	Heated Jumper
11	1204	0825	027.500	0.03	0.77	0.77	4	224	250	248	45	NA	60	60	N/A	
10		5	026.100	0.04	1.25	1.3	4	224	249	248	45		60	60		
9		7.5	030.000	0.04	1.29	1.3	4	224	249	248	45		60	60		
8		10	031.435	0.03	0.77	0.77	4	227	248	245	45		60	59		
7		12.5	032.780	0.04	1.26	1.25	4	229	248	250	45		60	60		
6		15	034.330	0.04	1.26	1.25	4	229	249	250	46		60	60		
5		17.5	035.950	0.04	1.26	1.25	4	229	248	255	47		61	60		
4		20	037.465	0.04	1.28	1.30	4	229	248	253	47		61	60		
3		22.5	039.060	0.04	1.28	1.30	4	227	249	253	47		61	59		
2		25	040.700	0.04	1.28	1.30	4	224	249	250	47		60	59		
1		27.5	042.320	0.03	0.97	0.97	4	222	250	250	47		61	59		
END	1232	30	043.660													
		TOTAL	36.347	ft3		1.198		225.8						60.4		

Train Leak Check During Test:

						Meter Reading Stop	Meter Reading Restart
Before Test:	/	Ft^3 in	/	Seconds at	/	In. Hg. / ft^3	/ ft^3
After Test:		Ft^3 in		Seconds at		In. Hg.	ft^3

Comments:

TRC Environmental Corp.

24166 Smithfield - Woodinville KU

CITY	STATE	ZIP
Woodinville	WA	98072

PHONE (KEY CONTACT)	SOURCE ID NUMBER
	Furnace #2

PROCESS EQUIPMENT	OPERATING MODE
Batch Cyclone Furnace	Normal
CONTROL EQUIPMENT	OPERATING MODE

DESCRIBE EMISSION POINT

Stack Exit

HEIGHT ABOVE GROUND LEVEL	HEIGHT RELATIVE TO OBSERVER
35 ft	Start 10 ft End 10 ft
DISTANCE FROM OBSERVER	DIRECTION FROM OBSERVER
Start 75 ft End 75 ft	Start N End N

DESCRIBE EMISSIONS

Start Clear End Clear

EMISSION COLOR	IF WATER DROPLET PLUME
Start None End None	Attached ☐ N/A Detached ☐

POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED

Start No Plume End No Plume

DESCRIBE PLUME BACKGROUND

Start Sky End Sky

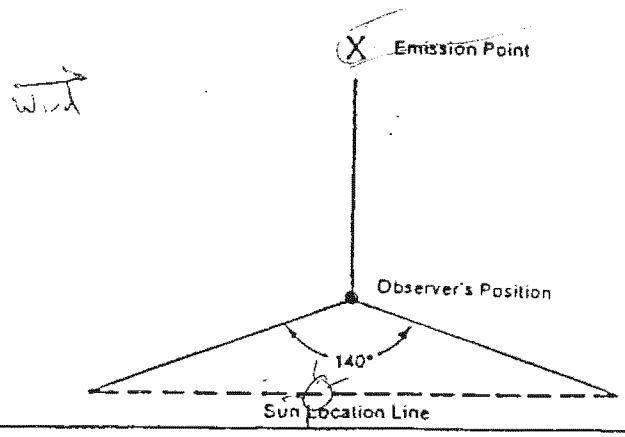
BACKGROUND COLOR	SKY CONDITIONS
Start White-Blue End Same	Start Partly Cloudy End Partly Cloudy
WIND SPEED	WIND DIRECTION
Start 5-10 mph End 5-10 mph	Start E End E

AMBIENT TEMP	WET BULB TEMP	RH, percent
Start N/A End N/A	N/A	N/A

Stack with Plume
Sun
Wind

SOURCE LAYOUT SKETCH

Draw North Arrow



MIN	0	15	30	45	COMMENTS
1	0	0	0	0	Start 1600
2	0	0	0	0	
3	0	0	0	0	
4	0	0	0	0	
5	0	0	0	0	
6	0	0	0	0	
7	0	0	0	0	
8	0	0	0	0	
9	0	0	0	0	
10	0	0	0	0	
11	0	0	0	0	
12	0	0	0	0	
13	0	0	0	0	
14	0	0	0	0	
15	0	0	0	0	
16	0	0	0	0	
17	0	0	0	0	
18	0	0	0	0	End 1618
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					

ADDITIONAL INFORMATION

OBSERVER'S NAME (PRINT): Pat Clark

OBSERVER'S SIGNATURE: [signature] DATE: 11/24/03

ORGANIZATION: TRC

CERTIFIED BY: [signature] DATE:

CONTINUED ON VEO FORM NUMBER

TRC Method 5/202 Data Sheet-Gravimetric Particulate Analysis

Client Name/Facility: Spectrum Glass Company Job No: 41613-0010-00000
City/State: Woodinville, WA Analytical Balance ID NO. 1121031038
Analyst: Paul Clark

Run Identification	units	Furnace #2 run # 1	Furnace #2 run # 2	Furnace #2 run # 3
Filter Analysis				
Filter Appearance				
Filter ID		110060	110061	110063
Filter Tare Weight	g	0.3822	0.3813	0.3581
Weight #1: Date/Time 12-19/1130	g	0.3820	0.3810	0.3580
Weight #2: Date/Time 12-22/0930	g	0.3821	0.3810	0.3582
Weight #3: Date/Time	g	—	—	—
PM On Filter	g			
Acetone Rinse Analysis				
Dried PM Rinse Appearance				
Any Loss? If Yes, Estimate Amount	g			
Sample Volume	mL	30-1	30	30
Beaker ID		109	508	104
Beaker Tare	g	66.8768	66.9207	67.1173
Weight #1: Date/Time 12-22/0945	g	66.8796	66.9322	67.1206
Weight #2: Date/Time 12-23/0945	g	66.8808	66.9337	67.1219
Weight #3: Date/Time 12-23/1630	g	66.8809	66.9340	67.1217
Weight #4: Date/Time	g	—	—	—
PM in Acetone Rinse	g			
Total Front-Half PM	mg			
Organic Fraction				
Dried PM Appearance				
Any Loss? If Yes, Estimate Amount	g			
Sample Volume	mL	30-1(A) 150-1(mcl)	45/160	30/150
Beaker ID	g	53	55	71
Beaker Tare	g	65.1259	67.2222	68.7585
Weight #1: Date/Time 12-23/1000	g	65.1288	67.2268	68.7618
Weight #2: Date/Time 12-23/1615	g	65.1301	67.2285	68.7626
Weight #3: Date/Time 12-24/1100	g	65.1297	67.2281	—
Weight #4: Date/Time	g	—	—	
PM in Organic Fraction	g			
Inorganic Fraction Analysis				
Dried PM Appearance				
Any Loss? If Yes, Estimate Amount	g			
Sample Volume	mL	490	410	430
Beaker ID		519	522	201
Beaker Tare	g	108.9628	108.9934	111.6543
Weight #1: Date/Time 12-22/0955	g	108.9627	108.9933	111.8650
Weight #2: Date/Time 12-23/0950	g	108.9639	108.9950	111.6570
Weight #3: Date/Time 12-23/1605	g	108.9643	108.9954	111.6570
Weight #4: Date/Time	g	—	—	—
PM in Inorganic Fraction	g			
Total Back-Half PM	g			
Total FH & BH PM	g			

QA/QC Check Completeness _____ Legibility _____ Accuracy _____
Specifications _____ Reasonableness _____
Checked by: _____(sign) _____(print) Date:_____
(Lab Supervisor or QA Manager)

TRC

Method 5/202 Data Sheet-Gravimetric Particulate Analysis

Client Name/Facility: Spectrum Glass Company — Job No: 41613-0010-00000

City/State: Woodinville, WA — Analytical Balance ID NO. 1121031038

Analyst: Paul Clark

Run Identification	units	Furnace #4 run # 1	Furnace #4 run # 2	Furnace #4 run # 3
Filter Analysis				
Filter Appearance				
Filter ID		110056	110057	110058
Filter Tare Weight	g	0.3859	0.3851	0.3843
Weight #1: Date/Time 12-19/1130	g	0.3857	0.3850	0.3840
Weight #2: Date/Time 12-22/0930	g	0.3858	0.3850	0.3841
Weight #3: Date/Time	g			
PM On Filter	g			
Acetone Rinse Analysis				
Dried PM Rinse Appearance				
Any Loss? If Yes, Estimate Amount	g			
Sample Volume	mL	40	40	40
Beaker ID		106	110	111
Beaker Tare	g	66.8984	65.3105	67.0751
Weight #1: Date/Time 12-22/0945	g	66.9060	65.3150	67.0819
Weight #2: Date/Time 12-23/0945	g	66.9052	65.3150	67.0823
Weight #3: Date/Time	g			
Weight #4: Date/Time	g			
PM in Acetone Rinse	g			
Total Front-Half PM	mg			
Organic Fraction				
Dried PM Appearance				
Any Loss? If Yes, Estimate Amount	g			
Sample Volume	mL	40/150	60/150	25/150
Beaker ID	g	100	101	102
Beaker Tare	g	67.1051	65.4323	67.2011
Weight #1: Date/Time 12-23/1000	g	67.1069	65.4354	67.2040
Weight #2: Date/Time 12-23/1615	g	67.1080	65.4365	67.2040
Weight #3: Date/Time 12-24/1100	g	67.1076	65.4363	
Weight #4: Date/Time	g			
PM in Organic Fraction	g			
Inorganic Fraction Analysis				
Dried PM Appearance				
Any Loss? If Yes, Estimate Amount	g			
Sample Volume	mL	400	380	495
Beaker ID		203	204	205
Beaker Tare	g	109.7129	110.9983	111.6707
Weight #1: Date/Time 12-22/0955	g	109.7128	110.0145	111.8739
Weight #2: Date/Time 12-23/0959	g	109.7132	110.9997	111.6737
Weight #3: Date/Time 12-23/1605	g		110.9993	111.6739
Weight #4: Date/Time	g			
PM in Inorganic Fraction	g			
Total Back-Half PM	g			
Total FH & BH PM	g			

QA/QC Check — Completeness _____ Legibility _____ Accuracy _____

Specifications _____ Reasonableness _____

Checked by: _____(sign) _____(print) Date:_____

(Lab Supervisor or QA Manager)

TRC

Method 5/202 Data Sheet-Gravimetric Particulate Analysis

Client Name/Facility: Spectrum Glass Company
City/State: Woodinville, WA
Analyst: Paul Clark

Job No: 41613-0010-00000
Analytical Balance ID NO. 1121031038

Run Identification	units	1	2	Average

Acetone Reagent Blank Analysis

Sample Volume	mL	100		
Beaker ID		107		
Beaker Tare	g	65.2248		
Weight #1: Date/Time 12-23/1000	g	65.2291		
Weight #2: Date/Time 12-23/1609	g	65.2288		
Weight #3: Date/Time	g	—		
Weight #4: Date/Time	g			
Acetone Blank Weight	g			
Wt./Vol of Acetone Blank	mg/mL			

CH_2Cl_2 Reagent Blank Analysis

Sample Volume	mL	150		
Beaker ID		108		
Beaker Tare	g	65.0485		
Weight #1: Date/Time 12-23/1020	g	65.0485		
Weight #2: Date/Time 12-23/1609	g	65.0484		
Weight #3: Date/Time	g	—		
Weight #4: Date/Time	g			
CH_2Cl_2 Weight Blank	g			
Wt./Vol of CH_2Cl_2 Blank	mg/mL			

DI H_2O Reagent Blank Analysis

Sample Volume	mL	400		
Beaker ID		212		
Beaker Tare	g	110.2026		
Weight #1: Date/Time 12-22/0855	g	110.2046		
Weight #2: Date/Time 12-23/0950	g	110.2049		
Weight #3: Date/Time	g	—		
Weight #4: Date/Time	g			
DI H2O Blank Weight	g			
Wt./Vol of DI H_2O Blank	mg/mL			

QA/QC Check Completeness _____ Legibility _____ Accuracy _____
Specifications _____ Reasonableness _____

Checked by: _____(sign) _____(print) Date:_____
(Lab Supervisor or QA Manager)

TRC

Method 5/202 Data Sheet-Gravimetric Particulate Analysis

Client Name/Facility: Spectrum Glass Company — Job No: 41613-0010-00000
City/State: Woodinville, WA — Analytical Balance ID NO. 1121031038
Analyst: Paul Clark

Run Identification	units	Furnace #2 run C-1	Furnace #4 run C-1	
Filter Analysis				
Filter Appearance				
Filter ID		110055	110059	
Filter Tare Weight	g	0.3847	0.3863	
Weight #1: Date/Time 12-14/1130	g	0.3845	0.3860	
Weight #2: Date/Time 12-27/1536	g	0.3846	0.3862	
Weight #3: Date/Time	g	—	—	
PM On Filter	g			
Acetone Rinse Analysis				
Dried PM Rinse Appearance				
Any Loss? If Yes, Estimate Amount	g			
Sample Volume	mL	30	35	
Beaker ID		105	511	
Beaker Tare	g	65.2323	68.8070	
Weight #1: Date/Time 12-22/0545	g	65.2386	68.8150	
Weight #2: Date/Time 12-23/0945	g	65.2399	68.8158	
Weight #3: Date/Time 12-24/1104	g	65.2395	68.8156	
Weight #4: Date/Time	g	—	—	
PM in Acetone Rinse	g			
Total Front-Half PM	mg			
Organic Fraction				
Dried PM Appearance				
Any Loss? If Yes, Estimate Amount	g			
Sample Volume	mL	25/200	45/200	
Beaker ID	g	506	103	
Beaker Tare	g	66.8493	65.0812	
Weight #1: Date/Time 12-23/1000	g	66.8523	65.0870	
Weight #2: Date/Time 12-23/1615	g	66.8535	65.0874	
Weight #3: Date/Time	g	—	—	
Weight #4: Date/Time	g			
PM in Organic Fraction	g			
Inorganic Fraction Analysis				
Dried PM Appearance				
Any Loss? If Yes, Estimate Amount	g			
Sample Volume	mL	470	420	
Beaker ID		702	209	
Beaker Tare	g	109.6982	114.7390	
Weight #1: Date/Time 12-22/0555	g	109.6986	114.7392	
Weight #2: Date/Time 12-23/0554	g	109.6999	114.7407	
Weight #3: Date/Time 12-23/1605	g	109.7000	114.7404	
Weight #4: Date/Time	g	—	—	
PM in Inorganic Fraction	g			
Total Back-Half PM	g			
Total FH & BH PM	g			

QA/QC Check — Completeness _____ Legibility _____ Accuracy _____
Specifications _____ Reasonableness _____

Checked by: _____(sign) _____(print) Date:_____
(Lab Supervisor or QA Manager)

APPENDIX D

EQUIPMENT CALIBRATION INFORMATION

APEX SOURCE TESTING EQUIPMENT INSTRUMENTS

S-TYPE PITOT TUBE CALIBRATION SHEET

Reference USEPA Reference Method 2 (40CFR60, App. A, Meth. 2)

PITOT SERIAL#: P1-A
PITOT TYPE:
STD. PITOT TYPE:
Cp(std):
CALIBRATED BY:

CALIBRATION DATE: 30-Oct-03
BAROMETRIC PRESSURE: 759.00 mm Hg
STATIC PRESSURE: -40.6 mm H_2O
BLOCKAGE %: n/a
CORRECTION FACTOR:

	SIDE "A" CALIBRATION			
RUN NO.	Pstd mm H_2O	P(s) mm H2O	Cp(s)	DEVIATION Cp(s) - avg.Cp(s)
1	19.4	26.4	0.849	-0.001
2	19.4	26.4	0.849	-0.001
3	19.4	26.2	0.852	0.002
		AVERAGE	0.850	

	SIDE "B" CALIBRATION			
RUN NO.	Pstd mm H_2O	P(s) mm H_2O	Cp(s)	DEVIATION Cp(s) - avg.Cp(s)
1	19.4	25.6	0.8618	0.002
2	19.4	25.8	0.8585	-0.001
3	19.4	25.8	0.8585	-0.001
		AVERAGE	0.860	

OVERALL AVERAGE: 0.855

ACCEPTANCE CRITERIA

AVG. ICp (A) - AVG. Cp (B)I	-0.0098	must be less than or equal to 0.01
Standard Deviation A =	0.0019	must be less than or equal to 0.01
Standard Deviation B =	0.0019	must be less than or equal to 0.01

If each of the above criteria are met the overall avg. Cp (Side A or Side B) may be used.

I certify that the above pitot tube was tested in accordance with the US EPA Method 2 standards.
See the Code of Federal Regulations, Title 40, Pat 60, Appendix A, Method 2, Item 4.

Signature _____ Date 10-30-03

TEMPERATURE DISPLAY CALIBRATION

Meter Console Number: **28579**
Reference Calibrator Make: **ALTEK** Model: **22TC** Serial No.: **10931602**
Operator: **M. Ellis** Date: **2/1/03**

Pretest

Thermocouple Number	Reference Temp #1	Meter temp	Criteria
T.C. # 1	100	100	0.000
T.C. #2	100	101	-0.179
T.C. #3	100	101	-0.179
T.C. #4	100	100	0.000
T.C.#5	100	100	0.000

Thermocouple Number	Reference Temp #2	Meter temp	Criteria
T.C. # 1	200	201	-0.152
T.C. #2	200	202	-0.303
T.C. #3	200	202	-0.303
T.C. #4	200	201	-0.152
T.C.#5	200	201	-0.152

Thermocouple Number	Reference Temp #3	Meter temp	Criteria
T.C. # 1	300	300	0.000
T.C. #2	300	301	-0.132
T.C. #3	300	301	-0.132
T.C. #4	300	300	0.000
T.C.#5	300	300	0.000

Thermocouple Number	Reference Temp #4	Meter temp	Criteria
T.C. # 1	400	399	0.116
T.C. #2	400	400	0.000
T.C. #3	400	400	0.000
T.C. #4	400	399	0.116
T.C.#5	400	399	0.116

Criteria: Percent differense between the Reference Tempature and the Average Tempature can only be + or - 1.5% R.

Equation: $$\frac{(\text{Ref. Temp.} + 460) - (\text{Temp. Reading} + 460) \times 100}{(\text{Ref. Temp.} + 460)}$$

SAMPLING NOZZLE CALIBRATION

Date	Nozzle No.	Diameter (in.) a	b	c	Average (DN)	Calibrated By	Caliper No.	QA Check if DN is OK
10/29/03	GA-2	0.151	0.151	0.150	0.151	PJC	CE1	DCJ
	GA-3	0.210	0.210	0.210	0.210	PJC	CE1	DCJ
	GA-4	0.270	0.269	0.270	0.270	PJC	CE1	DCJ
	GA-6	0.397	0.396	0.396	0.396	PJC	CE1	DCJ
	GA-7	0.456	0.456	0.456	0.456	PJC	CE1	DCJ
	GA-8	0.530	0.530	0.530	0.530	PJC	CE1	DCJ
	GB-2	0.145	0.145	0.146	0.145	PJC	CE1	DCJ
	GB-3	0.210	0.209	0.210	0.210	PJC	CE1	DCJ
	GB-4	0.267	0.269	0.268	0.268	PJC	CE1	DCJ
	GB-5	0.334	0.334	0.334	0.334	PJC	CE1	DCJ
	GB-6	0.401	0.402	0.403	0.402	PJC	CE1	DCJ
	GB-7	0.446	0.448	0.447	0.448	PJC	CE1	DCJ
	GB-8	0.525	0.525	0.525	0.525	PJC	CE1	DCJ
	GC-2	0.159	0.160	0.159	0.159	PJC	CE1	DCJ
	GC-3	0.213	0.213	0.214	0.213	PJC	CE1	DCJ
	GC-4	0.269	0.269	0.269	0.269	PJC	CE1	DCJ
	GC-6	0.400	0.398	0.401	0.400	PJC	CE1	DCJ
	GC-7	0.447	0.447	0.447	0.447	PJC	CE1	DCJ
	GC-8	0.529	0.530	0.530	0.530	PJC	CE1	DCJ

QA/QC Checked By: DCJ
Date: 10/30/03

Each diameter measured to 0.001 in.?
High to Low ≤ 0.004 in.?
Data set complete?

Nozzle number shall include material designation:
G=Pyrex glass Q=Quartz SS=Stainless steel T=Teflon
Three diameters must be measured and recorded.

TRC

THERMOCOUPLE CALIBRATION FORM (for TRC SOP AM-103)

ASTM Thermometer Serial No.: 5379

Thermocouple Calibrator
Make: _____ Model: _____ Serial No.: _____

Operator: Paul Clark Date: 1/6/04

Pretest: _____ Posttest: X

Thermocouple ID	Reference Temp 1, °F	Temp. Reading 1, °F	Criteria	Criteria Met	Reference Temp 2, °F	Temp. Reading 2, °F	Criteria	Criteria Met
Meter In	63	63	+/- 2°F	✓				
Meter Out	63	63		✓				
Probe	63	63		✓				
Probe Heat	63	64		✓				
Imp Exit	63	62	↓	✓				

Thermocouple ID	Reference Temp 3, °F	Temp. Reading 3, °F	Criteria	Criteria Met	Reference Temp 4, °F	Temp. Reading 4, °F	Criteria	Criteria Met

Criteria: Percent difference between the Reference Temperature and the Average Temperature can be only ± 1.5%°R.

Equation: $\frac{[(\text{Ref. Temp.} + 460) - (\text{Temp. Reading} + 460)] \times 100}{(\text{Ref. Temp.} + 460)}$

QA/QC Check By: DXT

Date: 01.06.04

Figure 1. Thermocouple Calibration Sheet

INNOCAL™
INNOVATIVE CALIBRATION SOLUTIONS

626 East Bunker Court • Vernon Hills, Illinois 60061-1844
TOLL FREE: 1-866-466-6626 • FAX: 847-247-2984 • www.InnoCalSolutions.com

NIST-TRACEABLE CALIBRATION CERTIFICATE

Catalog Number **17006-03**
Certificate Reference Number **4145105-00-1**
Purchase Order Number **JAASLAND72403**

Unit Under Test 1: 08003-53
Description: Ertco ASTM Glass Thermometer; range 18 - 89F; total immersion; 379 mm total length
Serial Number 1: 5379
Equipment Condition: USED

Certificate Completed for:
TRC ENVIRONMENTAL CORP
19501 144TH AVENUE NE
D 700
WOODINVILLE WA 98072

InnoCal certifies that the calibration of the listed units, used procedure number MWI-17006-03 with equipment traceable to the National Institute of Standards and Technology (NIST), and the test was performed in accordance with ANSI/NCSL Z540-1, ISO 17025.

Calibration has shown the equipment to meet with manufacturer tolerances listed on the next page.

Actual uncertainties available upon request.

Calibration Standards Used

Manufacturer	Function Performed	Model Number	Serial Number	Due Date
Burns Engineering	Platinum Resistance Probe	3925	403541	10/30/03
Ertco/Hart	Temperature Indicator	850	155	11/11/03

Lab Technician: 321

Date Completed: 07/25/2003 **Issue Date: 07/25/2003** **Received Date: 07/21/2003**

** Results data shown relates only to above listed item(s).*

INNOCAL™
INNOVATIVE CALIBRATION SOLUTIONS

625 East Bunker Court • Vernon Hills, Illinois 60061-1844
TOLL FREE 1-866-466-6225 • FAX 847-247-2984 • www.InnoCalSolutions.com

NIST-TRACEABLE CALIBRATION CERTIFICATE

Catalog Number **17006-03** Certificate Reference Number **4145105-00-1**

Instrument Tolerance

Unit 1: 0.1 scale division

	Equipment "As Found"				Equipment "As Left"		
Measured In:	Test Points	Reading	Deviation	O.O.T	Test Points	Reading	Deviation
°F	32.155	32.0	-0.155		32.155	32.0	-0.155
°F	54.903	55.0	0.097		54.903	55.0	0.097
°F	83.345	83.4	0.055		83.345	83.4	0.055

**** Note **** Check mark under the O.O.T column indicates the equipment is Out Of Tolerance.

This certificate was performed under the climate controlled lab conditions of: **20** °C **57** %RH **995** mbar

Additional Comments:

** Results data shown relates only to above listed item(s).*

ALTERNATIVE METHOD 2
THERMOCOUPLE CALIBRATION PROCEDURE

INTRODUCTION

In EPA Method 2, EPA recommended the use of an extrapolation technique for a simplified, post-test, thermocouple calibration procedure using a two point calibration: (1) ice bath and (2) boiling water. Because of the inherent accuracy and precision of the thermocouple within ±1.3□F in the range of -32□F to 2500□F, the two-point post-test calibration procedure may be replaced with a single-point check.

A single-point calibration procedure that checks the operation of a thermocouple system within ±1.0 percent of the absolute measured temperature is all that is necessary to check the system for the presence of disconnected wire junctions, other loose connections, or a potential miscalibrated emf readout. A system that performs accurately at one temperature is expected to behave similarly at other temperatures.

Therefore, an alternative to the Method 2, two-point, thermocouple calibration can be used and the procedure is as follows:

ALTERNATIVE POST-TEST AND RECOMMENDED PRETEST CALIBRATION PROCEDURE

After each test run series, check the accuracy (and, hence, the calibration) of each thermocouple system at ambient temperature, or any other temperature, within the range specified by the manufacture, using a reference thermometer (either ASTM reference thermometer or a thermometer that has been calibrated against an ASTM reference thermometer). The temperatures of the thermocouple and reference thermometers shall agree to within ±2□F.

A crimp in the connecting wires or crossed lines that change the location of the reference junction will affect readings. Check the continuity of the thermocouple by subjecting it to a change in the temperature (e.g.., removing it from the stack or touching an ice cube). This step will also check for loose connections and reversed connections (noted by a wrong change in the temperature).

To ensure linearity of the measurements, it is recommended that the emf meter be originally calibrated against a NIST traceable or a comparable voltage source at several points covering the range of intended use, e.g., 0, 500, 1000, and 2000□F.

REFERENCE

1. Shigehara, R.T., E.W. Stewart, Kenneth Alexander, "Simplified Thermocouple Calibration Procedure", Entropy, Incorporated, contained in the EMTIC TSAR Library.

PRETEST METER BOX CALIBRATION

Meter No.	28579
Pbar:	30.03

Calibration Test Meter (CTM)		Date:	2/27/2003
SDGM Serial No.:	971654	Operator:	M. Ellis

			Meter Volume	Temperatures, °F Meter In	Temperatures, °F Meter Out	CTM Volume	CTM Temp., °F	CTM Y_d	CTM Flow Rate (SCFM)
Delta H	0.5	Start	192.667	80	70	904.298	66		
				81	71		66		
				81	71		66		
Time (min)	15.00	Stop	198.965	81	71	910.407	66		
		Total	6.298	75.75		6.109	66.00		
		Average						0.998500	0.410
Delta H	1.0	Start	201.745	86	72	913.097	67		
				88	74		67		
				89	75		68		
Time (min)	15.00	Stop	210.420	89	75	921.506	68		
		Total	8.675	81.00		8.409	67.50		
		Average						0.998500	0.562
Delta H	1.5	Start	215.287	88	76	926.232	69		
				92	77		69		
				92	77		69		
Time (min)	15.00	Stop	225.978	92	77	936.602	69		
		Total	10.691	83.88		10.370	69.00		
		Average						0.998500	0.692
Delta H	2.0	Start	229.880	94	78	940.392	69		
				94	78		69		
				95	79		69		
Time (min)	15.00	Stop	242.160	95	79	952.305	69		
		Total	12.280	86.50		11.913	69.00		
		Average						0.998500	0.795
Delta H	3.0	Start	260.552	89	74	970.362	69		
				89	74		69		
				92	75		69		
Time (min)	15.00	Stop	275.482	92	75	984.982	69		
		Total	14.930	82.50		14.620	69.00		
		Average						0.998500	0.975

Acceptable Tolerances:
Y = +/- 0.02 from the average
dH@ = +/- 0.2 from the average

t	dH	Y	Variation	Delta H@	Variation
1	0.5	0.9853	-0.0065	1.656	-0.0636
2	1.0	0.9902	-0.0015	1.743	0.0235
3	1.5	0.9921	0.0003	1.722	0.0024
4	2.0	0.9958	0.0041	1.733	0.0139
5	3.0	0.9954	0.0036	1.743	0.0238
Average	Average	0.9918		1.719	
			PASSED		PASSED

Pre test cal

TRC
Customer Focused Solutions

POST TEST METER BOX CALIBRATION

Meter No.	28579
Pbar:	30.12

Calibration Test Meter (CTM)		Date:	12/29/2003
SDGM Serial No.:	28610	Operator:	M.Ellis

			Meter Volume	Temperatures, °F Meter In	Temperatures, °F Meter Out	CTM Volume	CTM Temp., °F	CTM Y_d	CTM Flow Rate (SCFM)
Delta H	1.0	Start	240.498	69	64	185.578	63		
				74	65		63		
				77	65		63		
Time (min)	15.00	Stop	249.005	77	66	194.004	63		
		Total	8.507	69.63		8.426	63.00	0.999000	0.570
		Average							

			Meter Volume	Temperatures, °F Meter In	Temperatures, °F Meter Out	CTM Volume	CTM Temp., °F	CTM Y_d	CTM Flow Rate (SCFM)
Delta H	1.0	Start	249.005	77	66	194.004	63		
				78	68		63		
				78	68		63		
Time (min)	15.00	Stop	257.585	78	68	202.468	63		
		Total	8.580	72.63		8.464	63.00	0.999000	0.573
		Average							

			Meter Volume	Temperatures, °F Meter In	Temperatures, °F Meter Out	CTM Volume	CTM Temp., °F	CTM Y_d	CTM Flow Rate (SCFM)
Delta H	1.0	Start	257.585	78	68	202.468	63		
				78	68		63		
				80	69		63		
Time (min)	15.00	Stop	266.227	80	69	210.971	63		
		Total	8.642	73.75		8.503	63.00	0.999000	0.576
		Average							

Acceptable Tolerances:
Y = +/-5% of Pretest Y

Pretest Y- 5%	0.942
Pretest Y	0.992
Pretest Y + 5%	1.041

dH	Y	Variation
1.0	0.9996	-0.0009
1.0	1.0012	0.0007
1.0	1.0007	0.0002
Average	1.0005	
	PASSED	

TRC
Customer Focused Solutions

APPENDIX E

PROJECT PARTICIPANTS

PROJECT PARTICIPANTS

Spectrum Glass Company

Mr. Larry Witsell, Glass Technologist
Ms. Sherry Van Mondfrans, Environmental & Safety Manager

Puget Sound Clean Air Agency (PSCAA)

Mr. Fred Austin, P.E., Source Test Engineer
Mr. John Schantz, Inspector

TRC Environmental Corporation

Mr. Wesley D. Snowden, Senior Program Manager
Mr. Paul Clark, Field Team Leader / NW Air Measurements Manager
Mr. Doug Towne, Sample Team Member / Project Manager
Mr. Matt Ellis, Sample Team Member
Ms. Judy Aasland, Report Preparation and Senior Project Assistant

YAKIMA REGIONAL CLEAN AIR AUTHORITY
NORTHWEST OPACITY CERTIFICATION
CERTIFICATE OF COMPLETION
PLUME EVALUATION TRAINING

Paul Clark

EPA REFERENCE METHOD 9 YES

CERTIFICATE NO WA-S97-23

EXPIRATION DATE 3/4/2004

BEARER'S SIGNATURE

PROGRAM COORDINATOR
NORTHWEST OPACITY CERTIFICATION

YAKIMA REGIONAL CLEAN AIR AUTHORITY
NORTHWEST OPACITY CERTIFICATION
CERTIFICATE OF COMPLETION
PLUME EVALUATION TRAINING

DOUG TOWNE

EPA REFERENCE METHOD 9 YES

CERTIFICATE NO 1499

EXPIRATION DATE 3/11/2004

BEARER'S SIGNATURE

PROGRAM COORDINATOR
NORTHWEST OPACITY CERTIFICATION